GMA 347 AUDIO PANEL INSTALLATION MANUAL



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NOTE

At the time of this edition, the current software version for the GMA 347 is 2.09. The software version and information in this document are subject to change without notice. Visit the Garmin web site (www.garmin.com) for current manual updates and supplemental information concerning the operation of this and other Garmin products.

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GMA 347 HARDWARE MOD LEVEL HISTORY

The following table identifies hardware modification (Mod) Levels for the GMA 347 Audio Panel. Mod Levels are listed with the associated service bulletin number, service bulletin date, and the purpose of the modification. The table is current at the time of publication of this manual (see date on front cover) and is subject to change without notice. Authorized Garmin Sales and Service Centers are encouraged to access the most up-to-date bulletin and advisory information on the Garmin Dealer Resource web site at www.garmin.com using their Garmin-provided user name and password.

MOD LEVEL	SERVICE BULLETIN NUMBER	SERVICE BULLETIN DATE	PURPOSE OF MODIFICATION

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1 GENERAL DESCRIPTION

1.1 Introduction

This manual presents mechanical and electrical installation requirements for installing the Garmin GMA 347 Audio Panel. The GMA 347 can be installed into a variety of airframes by means of an STC, TC or Field Approval. Each airframe installation may vary. Use only approved data for specific installation instructions in a particular aircraft. After installation of the GMA 347, FAA Form 337 must be completed by an appropriately certificated agency to return the aircraft to service.

1.2 Equipment Description

CAUTION

The operation of cellular telephones or other cellular mobile devices aboard aircraft while airborne is prohibited by FCC rules. Due to the potential for interference with onboard systems, the operation of cellular communication devices while onboard an aircraft that is on the ground is subject to (FAA) 14 CFR 91.21.

(FCC) 47 CFR 22.925 prohibits airborne operation of cellular telephones installed in or carried aboard aircraft. Cellular telephones must not be operated aboard any aircraft while the aircraft is off the ground. When any aircraft leaves the ground, all cellular telephones on board that aircraft must be turned off.

Cellular telephones that are on, even in a monitoring state, can disrupt GPS performance.

The Garmin GMA 347 is a horizontally oriented panel-mounted audio control panel and marker beacon system. The system delivers reliability and versatility for all audio controlling functions. LED-illuminated pushbuttons and logical panel layout allow audio selection of NAV, COM. LED annunciator brightness is adjusted to an appropriate level for ambient cockpit light conditions automatically by photocell dimming. Key brightness is controlled manually with the radio lighting dimming bus. A failsafe circuit connects the pilot's left headset channel and microphone directly to COM 1 in case power is interrupted or the unit is turned off.

The Garmin GMA 347 Audio Panel incorporates a microcontroller for processing front panel key commands, annunciator control, input/output functions, and communication.

The GMA 347 includes a six-position intercom system (ICS) with electronic cabin noise de-emphasis, two stereo music inputs, and combined pilot, copilot, and passenger volume controls. The intercom provides four selectable modes of isolation (All, Crew, Pilot, Copilot). A pilot-selectable cabin speaker output can be used to listen to the selected aircraft radios or to broadcast PA announcements. The PA function is pilot selectable.

The GMA 347 provides a digital voice recorder with playback capability. Recording is automatic when a COM signal is received. Playback is controlled by pressing the PLAY button or a remote mounted switch.

The Recorder can be disabled using an external switch. The digital recorder can playback up to two and a half minutes of recording. Refer to the GMA 347 Pilot's Guide (190-00325-00) for complete system operation.

The GMA 347 is FAA TSO approved to C50c and C35d Class A, and ETSO approved to C50c and 2C35d (pending). A marker beacon receiver with dual sensitivity and audio muting with automatic re-arming is included in the unit. Operating voltage range is from 11 to 33 volts.

The GMA 347 provides two stereo auxiliary entertainment inputs; MUSIC 1 and MUSIC 2. Two 3.5 mm stereo phone jacks should be installed in a convenient location for this purpose. These inputs are compatible with popular portable entertainment devices such as MP3 and CD players. The headphone outputs of these devices are plugged into the MUSIC 1 or MUSIC 2 jacks.

Only the pilot and copilot hear MUSIC 1. MUSIC 2 is a non-muted input heard only by the passengers. MUSIC 1 and MUSIC 2 characteristics are affected by the active intercom mode. Refer to the GMA 347 pilot's manual for details.

MUSIC 1 is soft-muted when an interruption occurs from an aircraft radio. Soft muting is the gradual return of MUSIC 1 to its original volume level. MUSIC 1 can also be configured to mute during ICS activity. MUSIC 2 is a non-muted input.

1.2.1 Features Summary

- Logical front panel layout
- LED annunciators indicate selected function
- Six position intercom: pilot, copilot, four passengers
- Three stereo headset amplifiers: one for pilot, one for copilot, and one for the passengers
- Two stereo music source inputs
- Four selectable intercom operational modes
- Independent pilot, copilot, and passenger volume control
- VOX control for mic inputs
- Automatic selection of radio audio source when corresponding mic is selected
- ***MASQ***™ Processing
- Split COM transceiver function. Copilot may transmit and receive on COM 2 while pilot transmits and receives on COM 1
- COM swap function
- TX indication
- ***SmartMute***™ marker audio muting
- Autosquelch
- Speaker output for radios or PA function
- Power-off fail safe connection for Pilot PTT, mic and Pilot's Headset-Left to COM 1
- Voice Recorder with Playback
- Configurable Options. See Sections 4 and 5 for connection and configuration details.

1.2.2 Interface Summary

The following is an interface summary for the GMA 347. See Section 4 and Appendix C for connection details.

- 3 Transceiver Inputs (Figure C-3)
- 5 Receiver Inputs (Figure C-3)
- 4 Unswitched Inputs (Figures C-3)
- 2 Aircraft Power Inputs (Figure C-1)
- Discrete Inputs/Outputs (Figure C-4)
- Marker Beacon Antenna Input (Figure C-1)
- External Marker Beacon Lamp Driver Outputs (Figure C-4)

1.3 Technical Specifications

The following tables present general environmental specifications. For detailed specifications, see the Environmental Qualification form in Appendix A.

1.3.1 Physical Characteristics

Specification	Characteristic
Bezel Height	1.3 inches (33 mm)
Bezel Width	6.29 inches (160 mm)
Rack Height	1.325 (34 mm)
Rack Width	6.30 inches (160 mm)
Depth Behind Panel with Connectors (measured from face of aircraft panel to rear of connector backshells)	7.79 inches (198 mm)
GMA 347 Unit Weight	1.7 lbs. (0.8 kg)
GMA 347 Rack Weight (Installed with rack and connectors)	2. 4 lbs. (1.1 kg)

1.3.2 Electrical Characteristics

Specification	Characteristic
Regulatory Compliance	RTCA/DO-160D Environmental Conditions and EUROCAE/ED-14D
Unit Software	RTCA/DO-178B Level D
Temperature Range	-45°C to +70°C
Altitude	55,000 Feet
Audio Panel	Transceiver inputs: 3 Receiver inputs: 5 Unswitched inputs: 4 Input impedance: 500 Ω Input isolation: 60 dB minimum Special functions: Failsafe operation, ***MASQ***™ processing Maximum Input: COM, NAV, DME, AUX, Failsafe, Unswitched inputs 1-3, Altitude Warning; 4 V rms TEL; 3.5 V rms
Intercom	Positions: 6 (pilot, copilot, 4 passengers) Volume controls: 2 (pilot, copilot/passengers) VOX level controls: 2 (pilot, copilot/passengers) VOX circuits: 6 (one per mic input) Music inputs (stereo): 2 (one input mutable) Music input impedance: 5 kΩ Music input level: Less than 500 mVac RMS for full output (typical). 1 Vac RMS MAX (3 Vac p-p) Microphone signal processing: 9 pole characteristic and special cabin noise band de-emphasis Intercom isolation modes: 4 (All, Pilot Isolate, Copilot Isolate, Crew Isolate) Special functions: Recorder with playback (automatic recording of selected COMs) up to 2.5 minutes of recording time. Automatic squelch: 6 (one per mic input) pilot selectable between auto and manual.
Headphone Outputs	Output amplifiers: 3, stereo (pilot, copilot, passengers) **Fidelity:** **Power into 150 Ω** **Distortion** 50 mW <0.5% 100 mW <5% Frequency response: music; 50 Hz to 20 kHz nominal Aircraft radio: 200 Hz to 6 kHz nominal ICS mic: (Special cabin noise band de-emphasis)
Speaker Outputs	Outputs selectable: 1, pilot selectable Output power: 10 watts into 4 Ω or 8 Ω, @ any normal supply voltage. Frequency response: 350 Hz to 6 kHz nominal Special functions: PA Mode, pilot selectable, including split operation
Marker Beacon Receiver	Frequency: Crystal controlled at 75 MHz Sensitivity: LO 1000 µV hard; HI 200 µV hard Selectivity: 6 dB @ ±10 kHz min, 40 dB @ ±200 kHz max. Input impedance: 50 Ω External lamp drive: 125 mA max each output Other outputs: Middle MKR sense Special functions: ***SmartMute***™ marker audio muting

1.3.3 Power Requirements

Characteristic	Specification
Input Voltage Range	11.0 to 33.0 Vdc. See the Environmental Qualification Form in Appendix A for details on surge ratings and minimum/maximum operating voltages.
Power Input	Operating Current: 3.75 amps max at 13.75 V 1.75 amps max at 27.5 V

1.4 Certification

The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The article may be installed only if performed under 14 CFR part 43 or the applicable airworthiness requirements.

1.4.1 TSO/ETSO Compliance

The GMA 347 is FAA TSO approved to TSO-C50c, TSO-C35d Class A, ETSO-C50c (pending) and ETSO-2C35d (pending).

For a list of ETSO deviations see the GMA 347 Declaration of Design and Performance, Garmin part number 190-00325-03.

1.4.2 TSO Deviations

The following table provides a list of applicable TSO deviations for the GMA 347.

TSO	Deviation
TSO-C35d	Garmin was granted a deviation from TSO-C35d to use RTCA DO-160D instead of RTCA DO-138 as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	Garmin was granted a deviation from TSO-C35d to use FAR §21.607(d) instead of FAR §37.7 as the general rules governing holders of the TSO authorizations.
TSO-C50d	Garmin was granted a deviation from TSO-C50d to use RTCA DO-178B instead of RTCA DO-178A as the standard for Software Considerations in Airborne Systems and Equipment Certification.
	Garmin was granted a deviation from TSO-C50d to use RTCA DO-160D instead of RTCA DO-160A as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.

1.5 Reference Documents

The following publications are sources of additional information for installing the GMA 347. Before installing the unit, the technician should read all referenced materials along with this manual.

Part Number	Document
190-00325-00	GMA 347 Pilot's Guide

1.6 Limited Warranty

This Garmin product is warranted to be free from defects in materials or workmanship for two years from the date of purchase. Within this period, Garmin will at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alteration or repairs.

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To obtain warranty service, contact your local Garmin Authorized Service Center. For assistance in locating a Service Center near you, call Garmin Customer Service at one of the numbers shown below.

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2 INSTALLATION OVERVIEW

2.1 Introduction

This section provides hardware equipment information for installing the GMA 347 Audio Panel, related hardware and suggestions relating to the marker beacon antenna. Installation of the GMA 347 should meet the requirements of FAA Advisory Circulars AC 43.13-1B and AC 43.13-2A where applicable. Cabling is fabricated by the installing agency to fit each particular aircraft.

2.2 Wiring

Use AWG #22 or larger wire for all connections unless otherwise specified in the interconnect diagrams in Appendix C. The standard pin contacts supplied in the connector kit are compatible with up to AWG #22 wire. In cases where some installations have more than one unit sharing a common circuit breaker, sizing and wire gauge is based on aircraft circuit breaker layout, length of wiring, current draw of units, and internal unit protection characteristics. Do not attempt to combine more than one unit on the same circuit breaker unless it is specified on aircraft manufacturer approved drawings.

In some cases, a larger gauge wire such as AWG #18 or #16 may be needed for power connections. Extended barrel contacts for AWG #16 and #18 wire are available from Garmin, if required. Special thin-wall heat shrink tubing is also provided to insulate the extended barrels inside the backshell. If using #16 or #18 barrel contacts, ensure that no two contacts are mounted directly adjacent to each other. This minimizes the risk of contacts touching and shorting to adjacent pins and to ground.

Ensure that routing of the wiring does not come in contact with sources of heat, RF or EMI interference. Check that there is ample space for the cabling and mating connectors. Avoid sharp bends in cabling and routing near aircraft control cables.

2.3 Cooling Air

The GMA 347 does not have provisions for attaching cooling air and does not generate an excessive amount of heat during typical operations, however the thermal characteristics of the installation should always be assessed. An undesireable thermal condition could be created due to the unit's own internal power dissipation combined with restricted ventilation, or due to heat generated by adjacent equipment. Limiting thermal build up, by means of fan or natural convection is always a good practice and is recommended to increase the product life.

2.4 Installation Materials

2.4.1 Configurations Available

The GMA 347 is available in three versions under the following part numbers. Catalog part numbers are shown with and without the installation kit.

Model	Front Panel Color	Unit P/N	Catalog P/N	Installation Kit
GMA 347	Black	011-00807-00	010-00275-00	No
GMA 347	Black	011-00807-00	010-00275-01	Yes
GMA 347	Gray	011-00807-10	010-00275-10	No
GMA 347	Gray	011-00807-10	010-00275-11	Yes
GMA 347H	Black	011-00807-20	010-00275-20	No
GMA 347H	Black	011-00807-20	010-00275-21	Yes

2.4.2 Equipment Available

Each of the following accessories is provided separately or in kit form for the GMA 347. The installation kit includes the unit and the following hardware:

Item	Garmin P/N
Sub Assy, Connector Kit, GMA 347	011-00813-01
SMP, Install Rack, GMA 347	115-00427-00
Sub Assy, Backplate, GMA 347	011-00812-00
Configuration Module Kit	011-00979-00
Garmin Marker Beacon Antenna Kit**	010-10175-00

** Note: A marker beacon antenna approved to TSO C35d that has been installed to meet the requirements of this manual may be approved for use with the GMA 347.

2.4.3 Additional Equipment Required

- Antenna sealant (use manufacturer's instructions, install according to FAA Advisory Circular AC 43.13-2A).
- Cables: The installer will fabricate and supply all system cables. Interconnect wiring diagrams are detailed in Appendix C.
- Hardware #6-32 x 100° Flat Head SS Screw [(MS24693, AN507R or other approved fastener) (6 ea.)] and #6-32 Self-Locking Nut [MS21042 or other approved fastener (6 ea.)]. Hardware required to mount the installation rack is not provided.
- Stereo headphone jacks (up to 6), microphone jacks (up to 6), 3.5 mm stereo jacks (up to 2), and insulating washers for all.

2.5 GMA 347 Wiring and Software Configuration Options

The GMA 347 can be configured in different ways for the flight crew. Consideration of options should be discussed with the end user(s) of the aircraft before wiring begins. While Section 4 and Appendix C contain connection details, the actual features employed or omitted are dependent on the wiring options and the Software configuration selected. Refer to Section 5 for configuration instructions.

2.5.1 Hard Wiring Configuration Options

The following list shows the hard wiring configuration options available for the GMA 347.

Function and Purpose	Hard Wiring Configuration Options
Com Swap. Transfers the active microphone between Com 1 and Com 2.	Com Swap Pushbutton Switch
External lamps. Provides an extra set of Marker Beacon indicators located away from the GMA 347.	External Marker Beacon Lights
Two Playback Options: An external pushbutton activates voice recorder playback. A toggle switch enables or disables recording.	Record Playback Pushbutton Switch Record Playback Toggle Switch
PA MUTE is an output from the GMA that is pulled low when active. It is used to trigger the mute function of an external PA system.	PA mute
A remote switch can be used to enable or disable the auxiliary input.	Remote Auxiliary Switch

2.5.2 Software Configuration Options

The following list shows the software configurations available for the GMA 347. Configuration program instructions are found in section 5.

Function and Purpose	Software Configuration
Audio Inputs. Allow or disable the use of external receivers	Enable or Disable DME, ADF, COM3, Play, PA, SPKR, TEL, and Split COM
Defeate the (MASQ) Master Squelch feature	Deactivate MASQ
Telephone. Remove telephone capability	Disable Telephone Channel
Sidetone. Disable the sound of transmission in the headset	Enable or Disable Sidetone
COM MUTE ON TX	Can be disabled. Audio on unselected COMs is muted while the selected COM is transmitting audio
COM MUTE ON RX	Can be disabled. Audio on unselected COMs is muted while the selected COM is receiving audio
Audio level. Volume control adjustment	Adjust Audio level of Music 1 and Music 2, Unswitched 1, Unswitched 2, Unswitched 3 and Altitude Warning, SPKR, Pilot and Copilot Mic Volume, Master Squelch Threshold, and Marker volume
Marker Threshold	Marker Beacon threshold levels are adjustable for HI and LO sense
ICS Mute	ICS Muting of Music 1 can be enabled or disabled
Record Com2	Pilot or Copilot COM recording. During the Split Com mode, COM 1 or COM 2 audio can be selected for voice recording and playback

2.5.1 Transmit Interlock and Split COM Operation

NOTE

Garmin makes no expressed or implied guarantees regarding the suitability of the Split COM feature in any given installation.

In small aircraft, COM and Nav receiver interference is affected by both the distance between antennas and the tuned frequency separation.

With transmit interlock activated in either the GMA 347 or the COM transceivers, Split COM operation between a flight crew of more than one pilot is affected.

In aircraft that have a transmit interlock feature, when either transmitter is keyed, all other receivers are muted so that they won't pick up interference from the active COM transmitter. This is the preferred option for single pilot operation.

For aircraft with two flight crew members, transmit-interlock would probably interfere with communications. When the pilot or the copilot transmit, no audio is heard on any other receiver. This

For aircraft with two flight crew members, transmit-interlock would probably interfere with communications. When the pilot or the copilot transmit, no audio is heard on any other receiver. This means that if the pilot is communicating with ATC while the copilot transmits on another radio, all pilot reception is cut off during the time of copilot transmission.

If the installation does not have transmit-interlock activated, all the receivers are listening all the time whether any radio is transmitting or not. Split COM performance varies significantly across installations.

If the transceivers interfere with each other, transmission by one radio produces static or squeal, thus loss of communication from any other radio.

2.6 Antenna Installation

2.6.1 Location Considerations

The marker beacon antenna should be mounted on a flat surface on the underside of the aircraft. Mount the antenna so that there is a minimum of structure between it and the ground radio stations. Locate it as far away as possible from transmitter antennas.

Best results with split COM mode will be obtained when the COM 1 and COM 2 antennas are mounted on opposite sides of the aircraft (top/bottom).

2.6.2 Marker Beacon Antenna Mounting

Install the marker beacon antenna according to the antenna manufacturer's instructions and FAA Advisory Circulars AC 43.13-1B and AC 43.13-2A, Chapters 2 and 3, as applicable. If the antenna is being installed on a composite aircraft, ground planes must be added. Conductive wire mesh, radials or thin aluminum sheets embedded in the composite material provide the proper ground plane allowing the antenna pattern (gain) to be maximized for optimum performance.

2.6.3 Marker Beacon Antenna Cable Installation

Use coaxial cable meeting the applicable aviation regulation for the marker beacon antenna. Any cable meeting specifications is acceptable for the installation. When routing antenna cables, observe the following precautions:

- All cable routing should be kept as short and as direct as possible.
- Avoid sharp bends.
- Avoid routing cables near power sources (e.g., 400 Hz generators, trim motors, etc.) or near power for fluorescent lighting.
- Avoid routing cable near ADF antenna cable (allow at least a 12-inch separation).

2.7 Installation Approval Considerations for Pressurized Aircraft

Antenna and cable installations on pressurized cabin aircraft require FAA approved installation design and engineering substantiation data whenever such installations incorporate alteration (penetration) of the cabin pressure vessel by connector holes and/or mounting arrangements.

For needed engineering support pertaining to the design and approval of such pressurized aircraft antenna installations, it is recommended that the installer proceed according to any of the following listed alternatives:

1. Obtain approved antenna installation design data from the aircraft manufacturer.

2. Obtain an FAA approved Supplemental Type Certificate (STC) pertaining to and valid for the subject antenna installation.

3. Contact the FAA Aircraft Certification Office in the appropriate Region and request identification of FAA Designated Engineering Representatives (DERs) who are authorized to prepare and approve the required antenna installation engineering data.

4. Obtain FAA Advisory Circular AC-183C and select (and contact) a DER from the roster of individuals identified thereunder.

5. Contact an aviation industry organization such as the Aircraft Electronics Association and request their assistance.

2.8 Electrical Noise

Because the audio panel is a point in the aircraft where signals from many pieces of equipment are brought together, take care to minimize effects from coupled interference and ground loops.

Coupled interference can creep into audio system interconnecting cables when they are routed near large AC electric fields, AC voltage sources and pulse equipment (strobes, spark plugs, magnetos, EL displays, CRTs, etc). Interference can also couple into audio system interconnecting cables by magnetic induction when they are routed near large AC current-carrying conductors or switched DC equipment (heaters, solenoids, fans, autopilot servos, etc).

Ground loops are created when there is more than one path in which return currents flow or when signal returns share the same path as large currents from other equipment. These large currents create differences in ground potential between the various equipment operating in the aircraft. These differences in potential can produce an additive effect on audio panel input signals.

The audio panel may “see” the desired input signal plus an unwanted component injected by ground differentials, a common cause of alternator-related noise. This is the main reason why all audio jacks should be isolated from ground. Terminating audio shields just at one end eliminates another potential ground loop injection point.

Single-point grounding cannot be overstressed for the various avionics producing and processing audio signals. Single-point, in this context, means that the various pieces of equipment share a single common ground connection back to the airframe. Good aircraft electrical/charging system ground bonding is also important.

The wiring diagrams and accompanying notes in this manual should be followed closely to minimize noise effects.

2.9 GMA 347 Mounting

The GMA 347 mounting surface must be capable of providing structural support and electrical bond to the aircraft to minimize radiated EMI and provide protection from High-Intensity Radiation Fields (HIRF).

The GMA 347 is mounted using it's own system rack. Figure 2-1 shows the GMA 347 unit rack.

1. Slide the unit into the rack until the front lobe of the unit touches the rack.
2. Insert a 3/32" hex wrench into the access hole on the faceplate.
3. Turn the hex wrench clockwise until the unit is secured in the rack. Continue turning until tight. Do not over-tighten the screw.
4. To remove the unit from the rack, turn the hex wrench counterclockwise until it disengages from the rack.

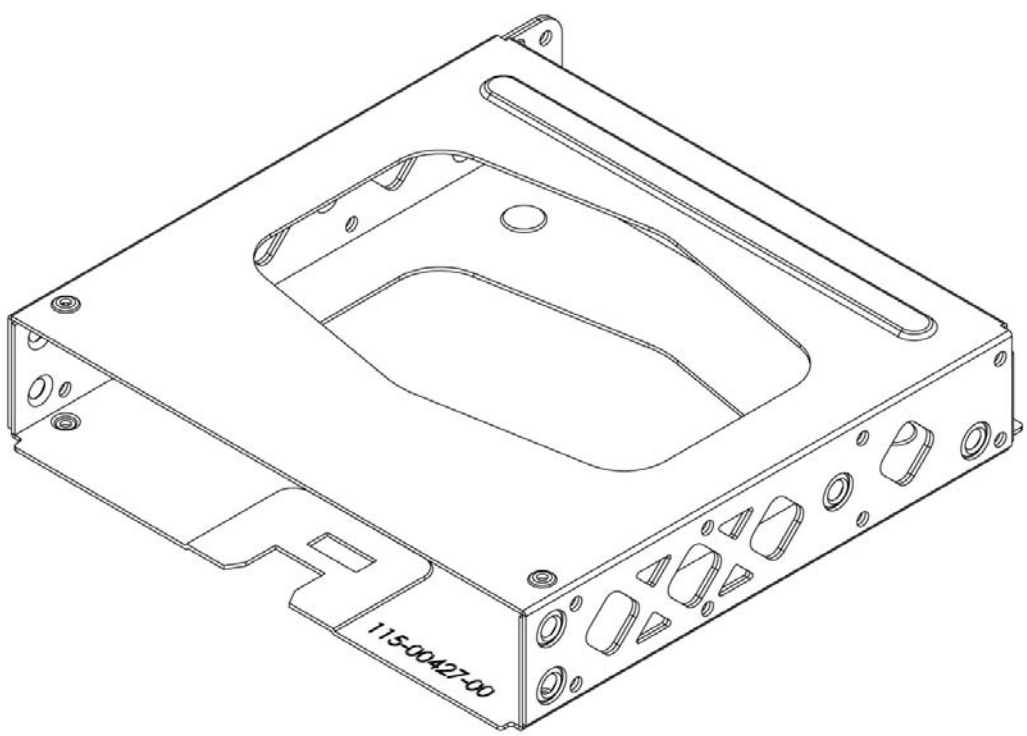


Figure 2-1. GMA 347 Unit Rack (115-00427-00)

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3 INSTALLATION PROCEDURE

3.1 Unpacking Unit

Carefully unpack the equipment and make a visual inspection of the unit for evidence of damage incurred during shipment. If the unit is damaged, notify the carrier and file a claim. To justify a claim, save the original shipping container and all packing materials. Do not return the unit to Garmin until the carrier has authorized the claim.

Retain the original shipping containers for storage. If the original containers are not available, a separate cardboard container should be prepared that is large enough to accommodate sufficient packing material to prevent movement of the item within the container.

3.2 Marker Beacon Antenna Installation

Install the marker beacon antenna according to the antenna manufacturer's instructions and FAA Advisory Circulars AC 43.13-1B and AC 43.13-2A Chapters 2 and 3, as applicable.

3.3 Marker Beacon Antenna Cable Connectors

The marker beacon antenna cable requires a BNC or similar coax connector on the antenna end. Follow connector manufacturer instructions for assembly of the antenna connector.

3.4 Electrical Connections

All electrical connections to the GMA 347, including the marker beacon antenna and shield ground, are made through two 78-pin D-subminiature connectors (see Figure 4-1). Tables in Section 4 define the electrical characteristics of all input and output signals. Required connector and associated hardware are supplied in the connector kit (P/N 011-00813-01). See figures in Appendix C for interconnect wiring diagrams.

CAUTION

Check wiring connections for errors before inserting the GMA 347 into the rack. Incorrect wiring could cause internal component damage.

Table 3-1. Pin Contact Part Numbers (Hi Density)

Manufacturer	78 pin D-Subminiature Connectors (P3471, 3472)			
	16 AWG (Power Only)	18 AWG (Power Only)	20 AWG	22-28 AWG
Garmin P/N	336-00044-01	336-00044-00	336-00044-02	336-00021-00
Military P/N	N/A	N/A	N/A	M39029/58-360
AMP	N/A	N/A	N/A	204370-2
Positronic	N/A	N/A	N/A	MC8522D
ITT Cannon	N/A	N/A	N/A	030-2042-000

Table 3-2. Recommended Crimp Tools (Hi Density)

Manufacturer	Hand Crimping Tool	16 & 18 & 20 AWG		22-28 AWG	
		Positioner	Insertion/ Extraction Tool (Note 2)	Positioner	Insertion/ Extraction Tool
Military P/N	M22520/2-01	N/A	M81969/1-04	M22520/2-09	M81969/1-04
Positronic	9507	9502-11	M81969/1-04	9502-3	M81969/1-04
ITT Cannon	995-0001-584	N/A	N/A	995-0001-739	N/A
AMP	601966-1	N/A	91067-1	601966-6	91067-1
Daniels	AFM8	K774	M81969/1-04	K42	M81969/1-04
Astro	615717	N/A	M81969/1-04	615725	M81969/1-04

NOTES

1. Non-Garmin part numbers shown are not maintained by Garmin and consequently are subject to change without notice.
2. Extracting the #16, #18 and #20 contact requires that the expanded wire barrel be cut off from the contact. It may also be necessary to push the pin out from the face of the connector when using an extractor due to the absence of the wire. A new contact must be used when reassembling the connector.

3.5 Backshell Assembly and D-Subminiature Connectors

The GMA 347 connector kit (011-00813-01) includes two Garmin backshell assemblies. Backshell connectors give the installer the ability to terminate shield grounds at the backshell housing using the Shield Block ground kit. The term 'D-Sub' (D-Subminiature) connectors have a letter "D" physical shape. D-Sub refers only to the polarized shell that holds the contacts (pins or sockets) in place. Table 3-3 lists Garmin part numbers for the GMA 347 D-Sub Connectors and the Backshell Assembly.

Table 3-3. Backshell Assembly (011-00812-00)

Figure Ref	Description	Garmin P/N
1	Cast Housing (From Garmin Backshell kit.)	125-00085-00
2	Shield block	117-00147-xx
3	Screw, 4-40 x.250, FLHP100°, SS/P, Nylon.	211-63234-08
4	Multiple Conductor Shielded Cable (See Interconnect Diagrams, Appendix C)	As Required
5	Shield Termination	As Required
6	Braid, Flat (19 – 20 AWG equivalent, tinned plated copper strands 36 AWG, Circular Mil Area 1000 – 1300)	As Required
7	Shrink Tubing	As Required
8	Pins	336-00021-00
9	Ring terminal, #8, insulated, 18-22 AWG, 14-16 AWG, 10-12 AWG	MS25036-149, MS25036-153, MS25036-156
10	Screw, PHP, 8-32x.312", Stainless or Cad Plated Steel	MS51957-42, MS35206-242
11	Split Washer, #8, (.045" compressed thickness) Stainless or Cad-plated steel	MS35338-137, MS35338-42
12	Flat Washer, #8, .032" thick, .174"ID, .375" OD, Stainless or Cad Plated Steel	NAS1149CN832R, NAS1149FN832P
13	Silicon Fusion Tape	249-00114-00
14	Strain Relief	115-00499-xx
15	Screw,4-40x.375,PHP,SS/P,w/Nylon	211-60234-10
16	Lid	115-00500-xx
17	Screw,4-40x.187,FLHP100,SS/P,w/Nylon	211-63234-06

3.5.1 Shield Block Assembly Procedure

The parts for the connector and backshell assembly, GMA 347 installations, are listed in Table 3-3 and shown in Figure 3-1.

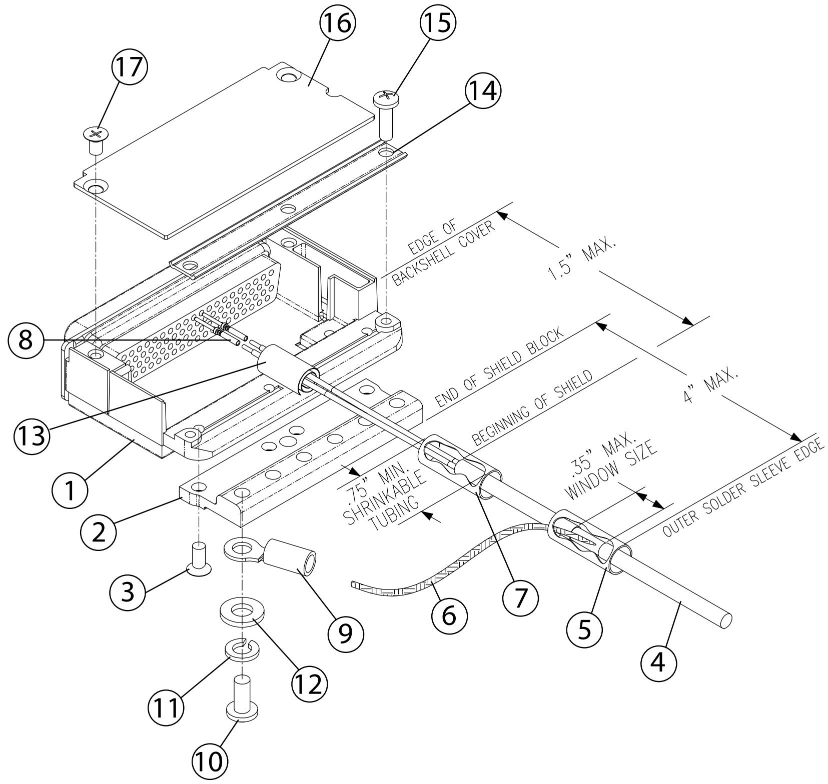


Figure 3-1. Shield Block Install onto Backshell Connector Assembly

Table 3-4. Shield Block Components

Backshell Assembly Garmin P/N	Shield Block Garmin P/N
011-00950-04 (78 Pin High Density)	011-01169-01

1. Attach the Shield Block(s) (2) to the backshell (1) by inserting the flathead screws (3) through the holes on the Shield Block and threading into the tapped holes on the backshell (1). (See Figure 3-1). The appropriate number of Shield Block kits is included in the GMA 347 connector kit.

Table 3-5. Shielded Cable Preparation

Float Min	Float Max	Ideal Float	Window Min	Window Max	Ideal Window
1.5”	2.5”	2.0”	3.0”	5.5”	4.5”

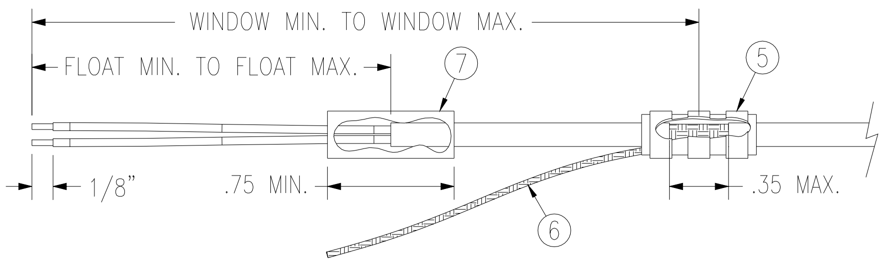


Figure 3-2. Shielded Cable Preparation

2. At one end of a shielded cable (4) measure back a distance between “Window Min” to “Window Max” (Table 3-5) and cut a window (max size 0.35”) in the jacket to expose the shield. (See Figure 3-2). Use caution when cutting the jacket to avoid damaging the individual braids of the shield. When dealing with a densely populated connector with many cables it may prove beneficial to stagger the windows throughout the “Window Min” to “Window Max” range. If staggering is not needed the “Ideal Window” length is recommended.

Tools needed to Accomplish the Window Cut:

- Coaxial Cable Stripper
- Thermal Stripper
- Sharp Razor Blade

3. Connect a Flat Braid (6) to the shield exposed through the window of the prepared cable assembly (4). The Flat Braid goes out the front of the termination towards the connector. Do not allow wires to exit the rear of the termination and loop back towards the connector. (See Figure 3-2). Make this connection using an approved shield termination technique. Refer to FAA Advisory Circular AC 43.13 as a reference for termination techniques.

Preferred Method, Solder Sleeves:

Slide a solder sleeve (5) onto the prepared cable assembly (4) and connect the Flat Braid (6) to the shield using a heat gun approved for use with solder sleeves. It may be easier to use a solder sleeve with a pre-installed Flat Braid versus having to cut a length of Flat Braid to be used. The chosen size of solder sleeve must accommodate both the number of conductors present in the cable and the Flat Braid (6) to be attached.

NOTE

> **Solder Sleeves with pre-installed Flat Braid:** A preferred solder sleeve is the Raychem S03 Series with the thermochromic temperature indicator. These solder sleeves come with a pre-installed braid and effectively take the place of items 5 and 6. For detailed instructions on product use, refer to Raychem installation procedure RCPS 100-70.

Raychem Recommended Heating Tools:

- HL1802E
- AA-400 Super Heater
- CV-1981
- MiniRay
- IR-1759

Individual Solder Sleeves and Flat Braid

Solder Sleeves:

Reference the following MIL-Specs for general solder sleeves:
(M83519/1-1, M83519/1-2, M83519/1-3, M83519/1-4, M83519/1-5).

Flat Braid:

If the preferred Raychem sleeves are not being used, the individual flat braid selected should conform to ASTMB33 for tinned copper and be made up of 36 AWG strands to form an approximately 19-20 AWG equivalent flat braid. A circular mil area range of 1000 to 1300 is required. The number of individual strands in each braid bundle is not specified.

NOTE

> Flat Braid as opposed to insulated wire is specified in order to insure continuing airworthiness by allowing for visual inspection of the conductor.

Secondary Method, Heat Shrink instead of Solder Sleeves:

Solder a Flat Braid (6) to the shield exposed through the window of the prepared cable assembly (4). Ensure a solid electrical connection through the use of acceptable soldering practices. Use care to avoid applying excessive heat that burns through the insulation of the center conductors and shorts the shield to the signal wire. Slide a minimum 0.75” of Teflon heat shrinkable tubing (5) onto the prepared wire assembly and shrink using a heat gun. The chosen size of heat shrinkage tubing must accommodate both the number of conductors present in the cable and the Flat Braid (6) to be attached.

4. At the same end of the shielded cable (4) and ahead of the previous shield termination, strip back "Float Min" to "Float Max" (Table 3-5) length of jacket and shield to expose the insulated center conductors. (See Figure 3-2). It may be best to build the "Ideal Float" length optimally.

Preferred Method:

The jacket and shield should be cut off at the same point so no shield is exposed. Slide 0.75" minimum of Teflon heat shrinkable tubing (7) onto the cable and use a heat gun to shrink the tubing. The chosen size of heat shrinkage tubing must accommodate the number of conductors present in the cable

Secondary Method:

Leave a max 0.35" of shield extending past the jacket. Fold this 0.35" of shield back over the jacket. Slide a solder sleeve (7) over the end of the cable and use a heat gun approved for solder sleeves to secure the connection. The chosen size of solder sleeve must accommodate the number of conductors present in the cable.

5. Strip back 1/8" of insulation and crimp a pin (8) to each of the conductors in the shielded cable.

6. Insert newly crimped pins and wires into the appropriate connector housing location as specified by the installation wiring diagrams.

7. Cut the Flat Braid (6) to a length with the addition of a ring terminal that will reach one of the tapped holes of the Shield Block (2). (See Figure 3-1). An appropriate amount of excess length without looping should be given to the Flat Braid (6) to allow it to move freely with the wire bundle. Note that the maximum distance from the backshell allowed for the window splice should keep the Flat Braid (6) to a worst case length of approximately 4".

8. Guidelines for terminating the newly cutoff Flat Braid(s) (item 6) with insulated ring terminals (9):

- Each tapped hole on the Shield Block (2) may accommodate only two ring terminals (9).
- It is preferred that only two Flat Braids (6) be terminated per ring terminal. Two Flat Braids per ring terminal will necessitate the use of a Ring terminal, #8, insulated, 14-16 AWG (MS25036-153).
- If only a single Flat Braid is left or if only a single Flat Braid is need for this connector, a Ring terminal, #8, insulated, 18-22 AWG (MS25036-149) can accommodate this single Flat Braid.
- If more braids exist for this connector than two per ring terminal, it is permissible to terminate three braids per ring terminal. This will necessitate the use of a Ring terminal, #8, insulated, 10-12 AWG (MS25036-156).
- In rare situations where more braids need to be terminated for this connector than three per ring terminal it is allowable to daisy chain a maximum of two shields together before coming to the ring terminal. (See Figure 3-3).

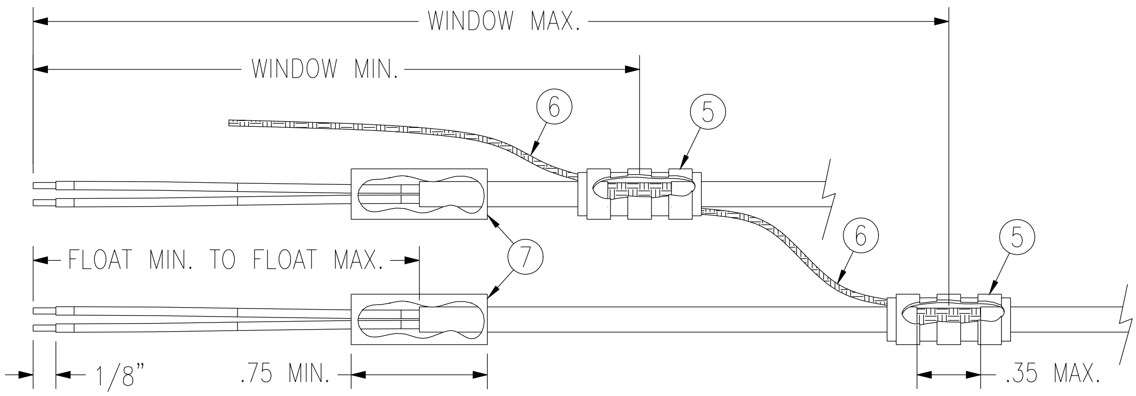


Figure 3-3: Daisy Chain Method for Shield Termination

9. Repeat steps 2 through 8 as needed for the remaining shielded cables.

10. Terminate the ring terminals to the Shield Block (2) by placing items on the Pan Head Screw (10) in the following order: Split Washer (11), Flat Washer (12), first Ring Terminal, second Ring Terminal if needed, before finally inserting the screw into the tapped holes on the Shield Block. Do not violate the guidelines presented in Step 8 regarding ring terminals.

11. It is recommended to wrap the cable bundle with Silicone Fusion Tape (13) (GPN: 249-00114-00 or a similar version) at the point where the backshell strain relief and cast housing will contact the cable bundle. Note: Choosing to use this tape is at the discretion of the installer.

12. Place the smooth side of the backshell strain relief (14) across the cable bundle and secure using the three screws (15). Warning: Placing the grooved side of the strain relief across the cable bundle may risk damage to wires.

13. Attach the cover (16) to the backshell (1) using two screws (17).

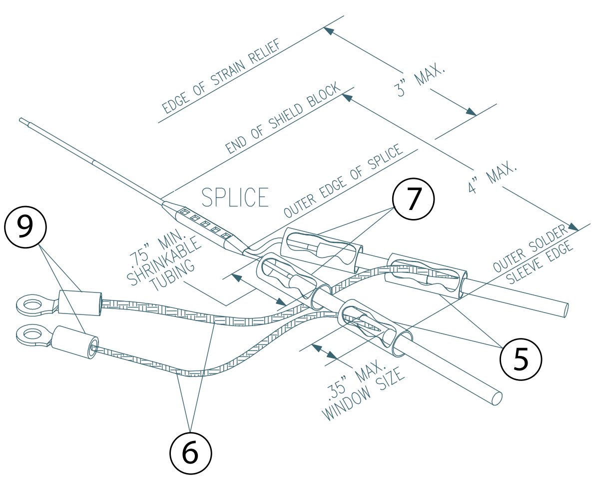


Figure 3-4: Parallel Shield Termination

3.5.2 Configuration Module Installation

Table 3-6 lists part numbers for the Configuration Module Kit.

Table 3-6. Configuration Module Kit – 011-00979-00

Item	Description	Garmin P/N
Configuration Module	PCB Board Assembly w/EEPROM	012-00605-00
Cable	4-Conductor Harness	325-00122-00
Crimp Pins	#22 AWG (HD)	336-00021-00
Spacer	Spacer, Config Module	213-00043-00

3.5.3 Configuration Module Assembly Procedure

Table 3-7. Configuration Module Wire Color Reference Chart

Color	Function	J3472 Pin
Black	Ground	1
Red	Vcc	21
Yellow	Data	40
White	Clock	60

1. Crimp pins (4) onto each wire of the four-conductor wire harness (3). Strip 1/8" of insulation from each wire prior to crimping.
2. Insert newly crimped pins and wires (3, 4) into the appropriate connector housing (5) location shown in the figure below.
3. Apply the spacer (2) by wrapping it around the PCB Board (1) making sure to insert the plastic connector mounted on the board into the hole provided in the spacer.
4. Plug the four-conductor wire harness (3) into the connector on the PCB Board (1).
5. Insert into the backshell (6) recess, PCB Board (1) with pad (2) in position.
6. Attach cover (7) to backshell (6) using screws (8).

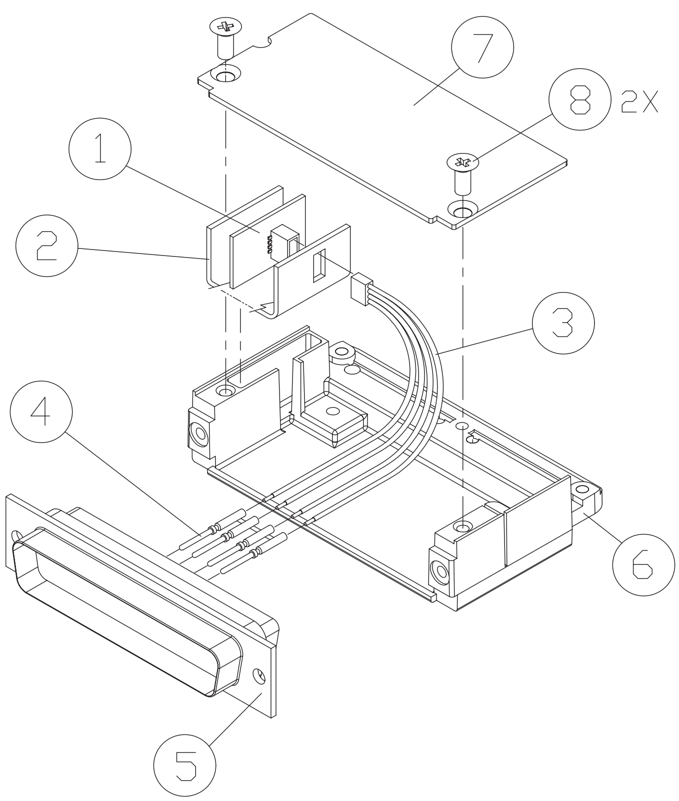


Figure 3-5. Configuration Module Installation

3.6 Circuit Breaker Placard

Install a Circuit Breaker Placard labeled Audio Panel, Audio Panel 1 or Audio Panel 2 as appropriate as indicated in FAA Advisory Circular AC 43.13-2A, Paragraph 27c(4).

3.7 GMA 347 Unit Installation

CAUTION

Do not use excessive force when inserting the GMA 347 into the rack. This may damage the connectors, unit, and/or unit rack. If heavy resistance is felt during installation, stop! Remove the GMA 347 and identify the source of resistance.

For final installation and assembly, refer to the outline and installation drawings shown in Appendix B of this manual.

1. Assemble the backshell as described in Section 3.5.
2. Connect both backshells to the rear plate using the screws provided in the connector kit.
3. Mount the unit rack to a suitable mounting location on the panel using the provided nutplates.
4. Assemble the rear plate into the GMA 347 unit rack.
5. Insert the GMA 347 into the rack, noting proper orientation as shown on the installation drawing in Appendix B.
6. Lock the GMA 347 in place using a 3/32 hex wrench.

3.8 Post Installation Configuration and Checkout

Refer to Section 5 for GMA 347 System Configuration.

CAUTION

Check wiring connections for errors before inserting the GMA 347 into the tray. Incorrect wiring could cause internal component damage.

Except for marker beacon operation, an in-aircraft checkout may be performed in the aircraft on the ramp with a known good microphone, headset, speaker and avionics receivers.

For testing the marker beacon, use a ramp tester that transmits a 75 MHz marker beacon test signal.

For installation checkout procedures refer to the GMA 347 Pilot's Guide (190-00325-00) for GMA 347 operation. Verify that every function of the GMA 347 operates correctly.

NOTE

In the following procedural steps outlined below, allow for variations in configuration settings for the particular unit under test.

3.8.1 Lamp Test

Apply power to the unit by rotating the Pilot's intercom volume knob clockwise out of the detent.

During power-up, the unit undergoes a self-test, illuminating all panel annunciator lights for approximately two seconds (between 1/2 and 2 seconds).

Confirm the operation of the GMA 347 internal LED annunciators and marker beacon LED's. Cover the photocell with a finger and observe that the LED annunciators dim automatically. Check the front panel key backlighting and dimming function. Key brightness is controlled with the aircraft radio lights dimming bus.

3.8.2 Failsafe Operation Check

1. Turn the unit off by rotating the Pilot's intercom volume knob counter clockwise.
2. Check the failsafe operation by exercising the COM 1 microphone, microphone key and audio over the headphones. A stereo headset connected to the Pilot headphone jack will provide audio in the left earphone only.
3. Turn the unit back on to continue testing.

3.8.3 Transceiver Operational Check

1. Perform a ramp test radio check by exercising the installed transceivers, microphone, microphone key and audio over the headphones and speaker.
2. Verify that communications are loud and clear and PTT operation is correct.

NOTE

Split COM performance varies significantly across installations and is affected by both the distance between the antennas and the separation of the tuned frequencies.

3. In appropriate installations, check for Pilot/Copilot microphone operation when using the Split COM (COM 1/2 key) function.

3.8.4 Intercom System (ICS) Check

NOTE

If a monaural headset is plugged into any stereo phone jack position, no damage will occur to the GMA 347. In the case of plugging a monaural headset into any passenger position, any stereo listener will lose one channel when another passenger plugs in a monaural headset.

1. Set the intercom to the ALL mode (Pilot and Copilot LED's off.)
2. Plug in headsets at each ICS position.
3. Adjust squelch and volume for each position and verify that the ICS is working properly.
4. Check Pilot and Copilot ICS positions for isolation and proper operation of volume and squelch controls.
5. Press and hold the SPKR key for two seconds. Verify that the SPKR key annunciator flashes, indicating the PA mode, and that microphone audio is heard over the speaker.

3.8.5 Aircraft Receivers Check

1. Select the audio source for each avionics unit installed in the aircraft and check for audio over the headsets.
2. Check for Pilot/Copilot audio isolation when pressing the Split COM (COM 1/2) key.
3. Press the SPKR key and verify that any selected audio is heard over the speaker.

3.8.6 Clearance Recording Check

1. Allow COM 1 receiver to operate for at least two and one half (2.5) minutes of active operation.
2. Press the PLAY key once to play back the latest recorded memory block of COM 1 audio.
3. Press the PLAY key again to play the previous memory block of COM 1 audio. Continue stepping backward into the memory blocks until listening to the first block of audio. A total of 2.5 minutes of audio is recorded.
4. Verify that after playing back the full 2.5 minutes of stored audio, that the playback system audio stops.

3.8.7 Music System Check

1. Set the intercom to the ALL mode (Pilot and Copilot LED's off.)
2. Connect a stereo audio source to MUSIC 1. Verify that stereo audio is heard over the Pilot and Copilot headset positions.
3. Tune a station on COM 1 and verify that the sound is muted by active COM 1 audio (break squelch on COM 1 if necessary).
4. Connect a stereo music source to MUSIC 2. Verify that stereo audio is heard in the passenger headsets.

3.8.8 Flight Check

CAUTION

Be sure to check all aircraft control movements before flight is attempted to insure that the wiring harness does not touch any moving part. Verify proper operation of the marker beacon during a flight test under VFR conditions.

Perform a flight test after installing the unit to ensure satisfactory performance of the audio and marker beacon receiver functions. Verify proper operation of the marker lamps and marker audio, including the marker audio mute function. Check proper operation of the sensitivity selection, using the SENS key, by flying towards the outer marker (OM) position initially using HI sensitivity. When the OM audio is just barely audible in the headset, switching to LO sensitivity should reduce or eliminate the audio.

This completes the in-aircraft post installation checkout.

4 SYSTEM INTERCONNECTS

NOTE

When installations that have a Garmin GMA 340 audio panel are being upgraded to a GMA 347, refer to figure C-5 in appendix C for a pin-to-pin comparison of the two units.

4.1 Connector Description

The GMA 347 has two 78-pin connectors located at the rear of the unit designated P3471 and P3472. P3471 and P3472 are clearly marked on the back of the rack. P3471 and P3472 pins are configured as shown in the following illustration:

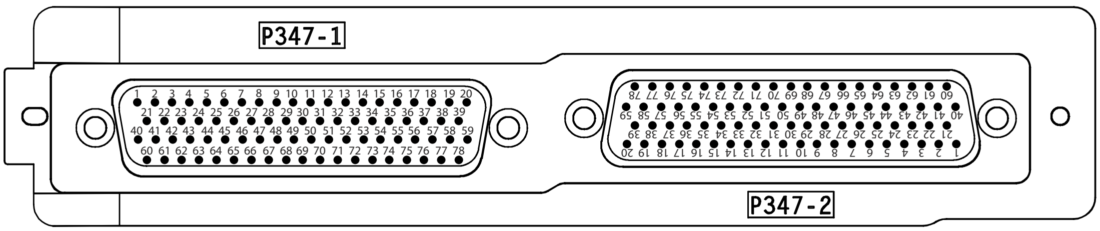


Figure 4-1. Backshell Rear Connector Plate

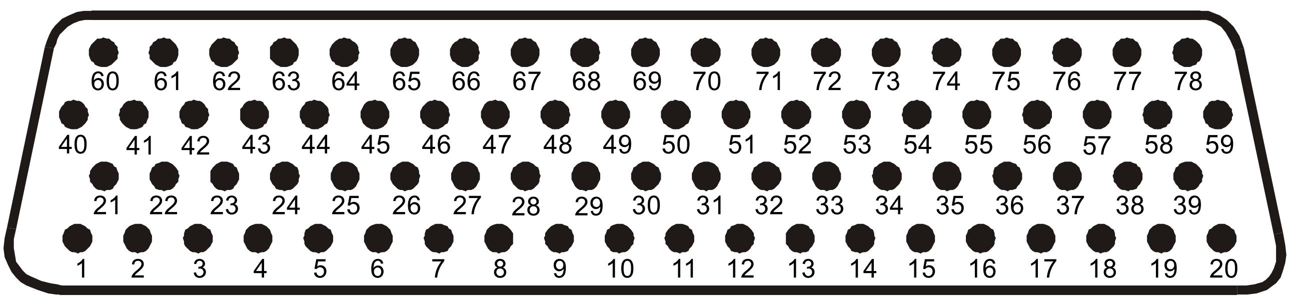


Figure 4-2. Rear Connectors J3471 and J3472, Viewed From Back of Unit

4.2 Connectors J3471 and J3472

J3471 and J3472 pin assignments are given in Tables 4-1 and 4-2.

Following the pin assignment table, additional tables group pin connections by function.

An asterisk (*) following a signal name denotes that the signal is an Active Low, requiring a ground to activate.

Table 4-1. J3471 Pin Assignments

Pin	Pin Name	I/O
1	FAIL SAFE WARN AUDIO IN	In
2	RESERVED	--
3	TEL RINGER AUDIO IN HI	In
4	TEL RINGER AUDIO IN LO	In
5	RESERVED	--
6	ON-SIDE NAV AUDIO IN HI	In
7	ON-SIDE COM AUDIO IN HI	In
8	ON-SIDE COM AUDIO LO	I/O
9	PILOT HEADSET AUDIO OUT LEFT	Out
10	PILOT HEADSET AUDIO OUT RIGHT	Out
11	PILOT HEADSET AUDIO OUT LO	Out
12	CROSS-SIDE COM AUDIO IN HI	In
13	CROSS-SIDE COM AUDIO LO	I/O
14	CROSS-SIDE NAV AUDIO IN HI	In
15	DME AUDIO IN HI	In
16	DME AUDIO IN LO	In
17	MUSIC IN 1 LEFT	In
18	MUSIC IN 1 RIGHT	In
19	UNSWITCHED AUDIO IN 1 HI	In
20	UNSWITCHED AUDIO IN 2 HI	In
21	RESERVED	--
22	RESERVED	--
23	TEL MIC AUDIO OUT HI	Out
24	PASS ICS KEY*	In
25	ON-SIDE NAV AUDIO IN LO	In
26	ON-SIDE COM MIC AUDIO OUT HI	Out
27	ON-SIDE COM MIC KEY*	Out
28	PILOT MIC AUDIO IN HI	In
29	PILOT MIC KEY* IN	In
30	PILOT MIC IN LO	In
31	PILOT ICS KEY*	In
32	CROSS-SIDE COM MIC AUDIO OUT HI	Out
33	CROSS-SIDE COM MIC KEY*	Out
34	CROSS-SIDE NAV AUDIO IN LO	In
35	ADF AUDIO IN HI	In
36	ADF AUDIO IN LO	In
37	MUSIC IN 1 LO	In

* Denotes Active Low (Ground to activate).

Table 4-1. J3471 Pin Assignments (Continued)

Pin	Pin Name	I/O
38	UNSWITCHED AUDIO IN 3 HI	In
39	UNSWITCHED AUDIO IN LO	In
40	RESERVED	--
41	RESERVED	--
42	TEL AUDIO IN HI	In
43	TEL AUDIO IN LO	In
44	PASS 3 MIC AUDIO IN HI	In
45	PASS 3 MIC AUDIO IN LO	In
46	PASS 1 MIC AUDIO IN HI	In
47	PASS 1 MIC AUDIO IN LO	In
48	PASS HEADSET AUDIO OUT LO	Out
49	COPILOT MIC AUDIO IN HI	In
50	COPILOT MIC KEY* IN	In
51	COPILOT MIC IN LO	In
52	COPILOT ICS KEY*	In
53	RESERVED	--
54	ALTITUDE WARN AUDIO IN HI	In
55	ALTITUDE WARN AUDIO IN LO	In
56	MUSIC IN 2 LEFT	In
57	MUSIC IN 2 RIGHT	In
58	COM 3 AUDIO IN HI	In
59	COM 3 AUDIO LO	I/O
60	RESERVED	--
61	RESERVED	--
62	TEL MIC AUDIO OUT LO	Out
63	PASS 4 MIC AUDIO IN HI	In
64	PASS 4 MIC AUDIO IN LO	In
65	PASS 2 MIC AUDIO IN HI	In
66	PASS 2 MIC AUDIO IN LO	In
67	PASS HEADSET AUDIO OUT LEFT	Out
68	PASS HEADSET AUDIO OUT RIGHT	Out
69	COPILOT HEADSET AUDIO OUT LEFT	Out
70	COPILOT HEADSET AUDIO OUT RIGHT	Out
71	COPILOT HEADSET AUDIO OUT LO	Out
72	RESERVED	--
73	RESERVED	--
74	AUX AUDIO IN HI	In
75	AUX AUDIO IN LO	In
76	MUSIC IN 2 LO	In
77	COM 3 MIC AUDIO OUT HI	Out
78	COM 3 MIC KEY*	Out

* Denotes Active Low (Ground to activate).

Table 4-2. J3472 Pin Assignments

Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
2	RESERVED	--
3	PROGRAM GROUND	--
4	RECORDER PLAY*	In
5	PROGRAM GROUND	--
6	RS-232 OUT 1	Out
7	RS-232 IN 1	In
8	RESERVED	--
9	RESERVED	--
10	RESERVED	--
11	PROGRAM GROUND	--
12	RESERVED	--
13	RESERVED	--
14	POWER GROUND	--
15	RESERVED	--
16	POWER GROUND	--
17	COM SWAP*	In
18	PROGRAM GROUND	--
19	RESERVED	--
20	RESERVED	--
21	CONFIG MODULE POWER OUT	Out
22	RESERVED	--
23	PROGRAM GROUND	--
24	RECORDER OFF SELECT*	In
25	PROGRAM GROUND	--
26	AUX SOURCE SELECT*	In
27	RESERVED	--
28	RESERVED	--
29	RESERVED	--
30	AIRCRAFT POWER 2	In
31	RESERVED	--
32	AIRCRAFT POWER 2	In
33	RESERVED	--
34	MIDDLE MARKER SENSE	Out
35	RESERVED	Out
36	RESERVED	--
37	GROUND RETURN	--

* Denotes Active Low (Ground to activate).

Table 4-2. J3472 Pin Assignments (Continued)

Pin	Pin Name	I/O
38	RS-232 OUT 2	Out
39	RS-232 IN 2	In
40	CONFIG MODULE DATA	I/O
41	SPEAKER AUDIO OUT LO	Out
42	SPEAKER AUDIO OUT HI	Out
43	RESERVED	--
44	PROGRAM GROUND	--
45	RESERVED	--
46	PROGRAM GROUND	--
47	RESERVED	--
48	RESERVED	--
49	RESERVED	--
50	RESERVED	--
51	14 V LIGHTING HI	In
52	28 V LIGHTING HI	In
53	AIRCRAFT POWER 1	In
54	RESERVED	--
55	AIRCRAFT POWER 1	In
56	RESERVED	--
57	GROUND RETURN	--
58	RESERVED	--
59	MARKER ANTENNA LO	In
60	CONFIG MODULE CLOCK	Out
61	RESERVED	--
62	RESERVED	--
63	RESERVED	--
64	PA MUTE* OUT	Out
65	TEL DISCRETE RINGER*	In
66	RESERVED	--
67	PROGRAM GROUND	--
68	RESERVED	--
69	POWER GROUND	--
70	RESERVED	--
71	POWER GROUND	--
72	RESERVED	--
73	RESERVED	--
74	AIRWAY/INNER MARKER EXT LAMP OUT	Out
75	MIDDLE MARKER EXT LAMP OUT	Out
76	OUTER MARKER EXT LAMP OUT	Out
77	RESERVED	--
78	MARKER ANTENNA HI	In

* Denotes Active Low (Ground to activate).

4.3 J3472 Connector Pin Assignments

This section covers the pin connections of J3472 only.

4.3.1 Aircraft Power and Lighting

Power Input requirements and Lighting Bus inputs are listed in the following tables. The power-input pins accept 11-33 Vdc. AIRCRAFT POWER 2 is for connecting to an alternate power source, such as on aircraft with two electrical buses. Refer to Figure C-1 for power interconnections.

Table 4-3. Aircraft Power Pin Assignments, J3472

Pin	Pin Name	Description	I/O
53	AIRCRAFT POWER 1	Unit power	In
55	AIRCRAFT POWER 1	Unit power	In
30	AIRCRAFT POWER 2	Unit power	In
32	AIRCRAFT POWER 2	Unit power	In
69	POWER GROUND	Aircraft ground	--
71	POWER GROUND	Aircraft ground	--
14	POWER GROUND	Aircraft ground	--
16	POWER GROUND	Aircraft ground	--

4.3.2 Lighting Bus

The GMA 347 can be configured to track a 28 Vdc or 14 Vdc lighting bus using these inputs. Refer to Figure C-1 for lighting interconnections.

Table 4-4. Aircraft Lighting Pin Assignments, J3472

Pin	Pin Name	Description	I/O
51	14 V LIGHTING HI	14V Backlighting input, 0 to 14 Vdc	In
52	28 V LIGHTING HI	28V Backlighting input, 0 to 28 Vdc	In

4.3.3 RS-232 Serial Input/Output

Table 4-5. RS-232 Pin Assignments, J3472

Pin	Pin Name	Description	I/O
6	RS-232 OUT 1	Output level greater than ±5 Volts	Out
7	RS-232 IN 1	Input level up to ±25 volts	In
38	RS-232 OUT 2	Output level greater than ±5 Volts	Out
39	RS-232 IN 2	Input with level up to ±25 volts	In

The RS-232 outputs conform to EIA/TIA-232C with an output voltage swing of at least ±5 V when driving a standard RS-232 load. The RS-232 IN/OUT 1 connections are used to upload configuration data into the unit. The unit is configured out of the aircraft, before final installation. Refer to Section 5 for configuration instructions.

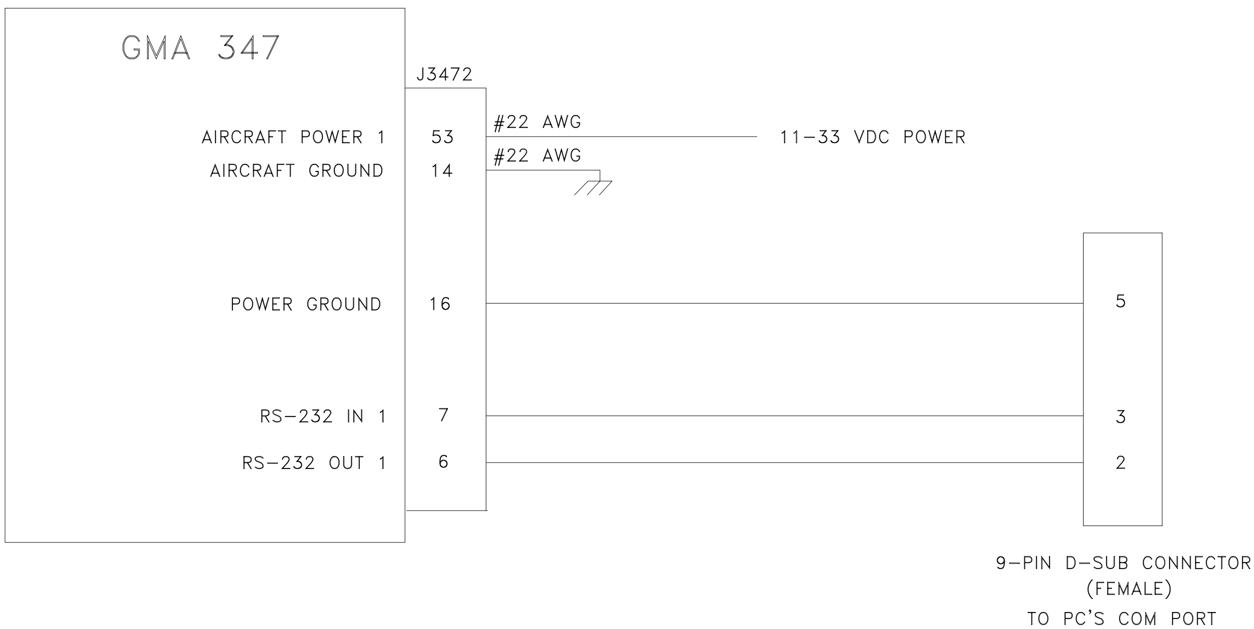


Figure 4-3. GMA 347 Configuration Upload Connections

4.3.4 Marker Beacon Functions

Marker Beacon connections are listed in the following table. The antenna input is connected to pins 78 (HI or Center Conductor) and 59 (LO or Shield).

Table 4-6. Marker Beacon Pin Assignments, J3472

Pin	Pin Name	Description	I/O
34	MIDDLE MARKER SENSE	2.5-8 Vdc into 4.7 kΩ	Out
74	AIRWAY/INNER MARKER EXT LAMP OUT	MKR I-HI white 2.5-8 Vdc into 56 Ω	Out
75	MIDDLE MARKER EXT LAMP OUT	MKR M-HI amber. 2.5-8 Vdc into 56 Ω	Out
76	OUTER MARKER EXT LAMP OUT	MKR O-HI blue. 2.5-8 Vdc into 56 Ω	Out
78	MARKER ANTENNA HI	Marker antenna input, 50 Ω	In
59	MARKER ANTENNA LO	Ground reference for pin 78	--

4.3.5 Installation Selection Inputs

The following table shows the Installation Selection Inputs of J3472. The selection inputs have an input and a program ground. When the input is grounded, the input function is selected.

Table 4-7. Installation Selection Inputs Pin Assignments, J3472

Pin	Pin Name	Description	I/O
4	RECORDER PLAY*	An external pushbutton switch activates voice recorder playback.	In
5	PROGRAM GROUND		--
17	COM SWAP*	When enabled, COM 1 and COM 2 are swapped. This is used with a switch tied to ground for momentary operation.	In
18	PROGRAM GROUND		--
24	RECORDER OFF SELECT*	When enabled, the voice recorder is disabled.	In
25	PROGRAM GROUND		--
26	AUXILIARY SOURCE SELECT*	This input is used for an external switch tied to ground to control the auxiliary audio.	In
65	TEL DISCRETE RINGER*	This input is for use with a cellular phone with a digital output.	In

* Denotes Active Low (Ground to activate).

4.3.6 External Configuration Module

The configuration module contains an I2C temp sensor and EEPROM. The configuration module is located in the connector backshell. The configuration module stores a backup of the unit configuration.

Table 4-8. External Configuration Module Pin Assignments, J3472

Pin	Pin Name	Description	I/O
1	Configuration Module Ground	Ground	--
21	Configuration Module Power	+3.3 VDC	In
40	Configuration Module Data	Bi-directional data line	In/Out
60	Configuration Module Clock	Signal used to clock data input\output	Out

4.3.7 Speaker

The speaker output is capable of driving up to 10 Watts into a 4 Ω or 8 Ω speaker.

Table 4-9. Speaker Pin Assignments, J3472

Pin	Pin Name	Description	I/O
41	SPEAKER AUDIO OUT LO	Ground reference for speaker audio	--
42	SPEAKER AUDIO OUT HI	Speaker audio output	Out

4.3.8 PA MUTE

PA MUTE is an output that when pulled low is active. It is used to trigger the mute function on an external PA system.

Table 4-10. PA MUTE Pin Assignments, J3472

Pin	Pin Name	Description	I/O
64	PA MUTE* OUT	Output capable of sinking 500 mA	Out

* Denotes Active Low (Ground to activate).

4.4 J3471 Connector Pin Assignments

This section covers the pin connections of J3471 only.

4.4.1 Mic Audio Inputs and Mic Keys

Table 4-11. Mic Audio Inputs and Mic Key Pin Assignments, J3471

Pin	Pin Name	Description	I/O
29	PILOT MIC KEY* IN	Enables audio into the respective transceiver unit	In
50	COPILOT MIC KEY* IN		In
28	PILOT MIC AUDIO IN HI	Pilot Mic audio input and ground reference	In
30	PILOT MIC IN LO		--
49	COPILOT MIC AUDIO IN HI	Copilot Mic audio input and ground reference	In
51	COPILOT MIC IN LO		--
46	PASS 1 MIC AUDIO IN HI	Passenger 1 Mic audio and ground reference	In
47	PASS 1 MIC AUDIO IN LO		--
65	PASS 2 MIC AUDIO IN HI	Passenger 2 Mic audio and ground reference	In
66	PASS 2 MIC AUDIO IN LO		--
44	PASS 3 MIC AUDIO IN HI	Passenger 3 Mic audio and ground reference	In
45	PASS 3 MIC AUDIO IN LO		--
63	PASS 4 MIC AUDIO IN HI	Passenger 4 Mic audio and ground reference	In
64	PASS 4 MIC AUDIO IN LO		--

* Denotes Active Low (Ground to activate).

4.4.2 ICS Keys

Table 4-12. ICS Key Pin Assignments, J3471

Pin	Pin Name	Description	I/O
31	PILOT ICS KEY*		In
52	COPILOT ICS KEY*	Enables audio into the intercom system	In
24	PASS ICS KEY*		In

* Denotes Active Low (Ground to activate).

4.4.3 Com Audio and Mic Keys

Table 4-13. Com Audio and Mic Keys Pin Assignments, J3471

Pin	Pin Name	Description	I/O
27	ON-SIDE COM MIC KEY*	Enables audio into the respective transceiver unit	In
33	CROSS-SIDE COM MIC KEY*		In
78	COM 3 MIC KEY*		In
7	ON-SIDE COM AUDIO IN HI	Com 1 audio input	In
26	ON-SIDE COM MIC AUDIO OUT HI	Com 1 audio output	Out
8	ON-SIDE COM AUDIO LO	Ground reference for Com 1 audio	--
12	CROSS-SIDE COM AUDIO IN HI	Com 2 audio input	In
32	CROSS-SIDE COM MIC AUDIO OUT HI	Com 2 audio output	Out
13	CROSS-SIDE COM AUDIO LO	Ground reference for Com 2 audio	--
58	COM 3 AUDIO HI	Com 3 audio input	In
77	COM 3 MIC AUDIO OUT HI	Com 3 audio output	Out
59	COM 3 AUDIO LO	Ground reference for Com 3 audio	--

* Denotes Active Low (Ground to activate).

4.4.4 Nav Audio

Table 4-14. Nav Audio Pin Assignments, J3471

Pin	Pin Name	Description	I/O
6	ON-SIDE NAV AUDIO IN HI	Nav 1 audio input	In
25	ON-SIDE NAV AUDIO IN LO	Nav 1 ground reference	--
14	CROSS-SIDE NAV AUDIO IN HI	Nav 2 audio input	In
34	CROSS-SIDE NAV AUDIO IN LO	Nav 2 ground reference	--

4.4.5 Headset Outputs

Table 4-15. Headset Outputs Pin Assignments, J3471

Pin	Pin Name	Description	I/O
9	PILOT HEADSET AUDIO OUT LEFT	Pilot headset audio output	Out
10	PILOT HEADSET AUDIO OUT RIGHT		Out
11	PILOT HEADSET AUDIO OUT LO	Ground reference for pilot headset	--
69	COPILOT HEADSET AUDIO OUT LEFT	Copilot headset audio output	Out
70	COPILOT HEADSET AUDIO OUT RIGHT		Out
71	COPILOT HEADSET AUDIO OUT LO	Ground reference for copilot headset	--
67	PASS HEADSET AUDIO OUT LEFT	Passenger headset audio output	Out
68	PASS HEADSET AUDIO OUT RIGHT		Out
48	PASS HEADSET AUDIO OUT LO	Ground reference for passenger headset	--

4.4.6 Music Inputs

Table 4-16. Music Inputs Pin Assignments, J3471

Pin	Pin Name	Description	I/O
17	MUSIC IN 1 LEFT	Music 1 input	In
18	MUSIC IN 1 RIGHT		In
37	MUSIC IN 1 LO	Ground reference for music 1	--
56	MUSIC IN 2 LEFT	Music 2 input	In
57	MUSIC IN 2 RIGHT		In
76	MUSIC IN 2 LO	Ground reference for music 2	--

4.4.7 Unswitched Audio Inputs

Table 4-17. Unswitched Audio Inputs Pin Assignments, J3471

Pin	Pin Name	Description	I/O
19	UNSWITCHED AUDIO IN 1 HI	Unswitched audio inputs	In
20	UNSWITCHED AUDIO IN 2 HI		In
38	UNSWITCHED AUDIO IN 3 HI		In
39	UNSWITCHED AUDIO IN LO	Ground reference for unswitched audio	--
54	ALTITUDE WARN AUDIO IN HI	Unmuted/unswitched input	In
55	ALTITUDE WARN AUDIO IN LO	Ground reference for altitude warning	--

4.4.8 Telephone I/O

Table 4-18. Telephone Inputs/Outputs Pin Assignments, J3471

Pin	Pin Name	Description	I/O
3	TEL RINGER AUDIO IN HI	Ringtone audio input	In
4	TEL RINGER AUDIO IN LO	Ground reference for telephone ringer audio input	In
23	TEL MIC AUDIO OUT HI	Transmitted telephone audio output	Out
62	TEL MIC AUDIO OUT LO	Ground reference for telephone Mic audio	--
42	TEL AUDIO IN HI	Received telephone audio input	In
43	TEL AUDIO IN LO	Ground reference for telephone input	--

4.4.9 AUX, DME and ADF Audio

Table 4-19. AUX, DME and ADF Audio Pin Assignments, J3471

Pin	Pin Name	Description	I/O
74	AUX AUDIO IN HI	Extra switched audio input	In
75	AUX AUDIO IN LO	Ground reference for extra switched audio input	--
15	DME AUDIO IN HI	Distance measuring equipment audio input	In
16	DME AUDIO IN LO	Ground reference for DME audio input	--
35	ADF AUDIO IN HI	Automatic direction finder audio input	In
36	ADF AUDIO IN LO	Ground reference for automatic direction finder audio input	--

4.4.10 Failsafe Audio

Table 4-20. Failsafe Audio Pin Assignments, J3471

Pin	Pin Name	Description	I/O
1	FAIL SAFE WARN AUDIO IN	Audio summed to the pilots headset left and COM 1 when power fails	In

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5 POST INSTALLATION CONFIGURATION AND CHECKOUT PROCEDURE

5.1 Post Installation Configuration Harness

Refer to figure 4-3 for GMA 347 Configuration Upload Connections.

5.2 Program Information

Garmin Product	GMA 347 Configuration Tool
Used for:	GMA 347, GMA 347H, GMA 347 2ADF
Program Archive	006-A0115-00
File Name	GMA_CONFIG.EXE
GMA_CONFIG.EXE version at time of this document	2.02

5.3 GMA Configuration Tool Version

NOTE

To find the version of the GMA Configuration Tool, right click anywhere along the top of the GMA Configuration Tool window and choose "About GMA Configuration Tool". See Figure 5-1.



Figure 5-1 About GMA Config Tool

5.4 Configuration Tool Introduction

References to the GMA 347 throughout this document apply to all versions of the GMA 347 unit types, the GMA 347, GMA 347H, and the GMA 347 2ADF.

The GMA Configuration Tool, GPN 006-A0115-00, is used to configure the GMA 347 through a PC serial port. The GMA Configuration Tool allows the ability to send updated configuration information and upload SYSTEM or BOOT BLOCK Hex file code to a GMA 347 via a PC's RS-232 COM port. The application can also be used to query the GMA 347 for its current configuration information. Figure 5-2 shows the configurations that can be altered. Each configuration item has a SET value and an ACTIVE value. The ACTIVE value is what the unit currently has stored, and the SET value is used to change the current ACTIVE state.

The Configuration Tool program will show the Hardware Unit type as being a GMA 347, the current system Software Version, the Software Part Number, and the Product Serial Number.

-

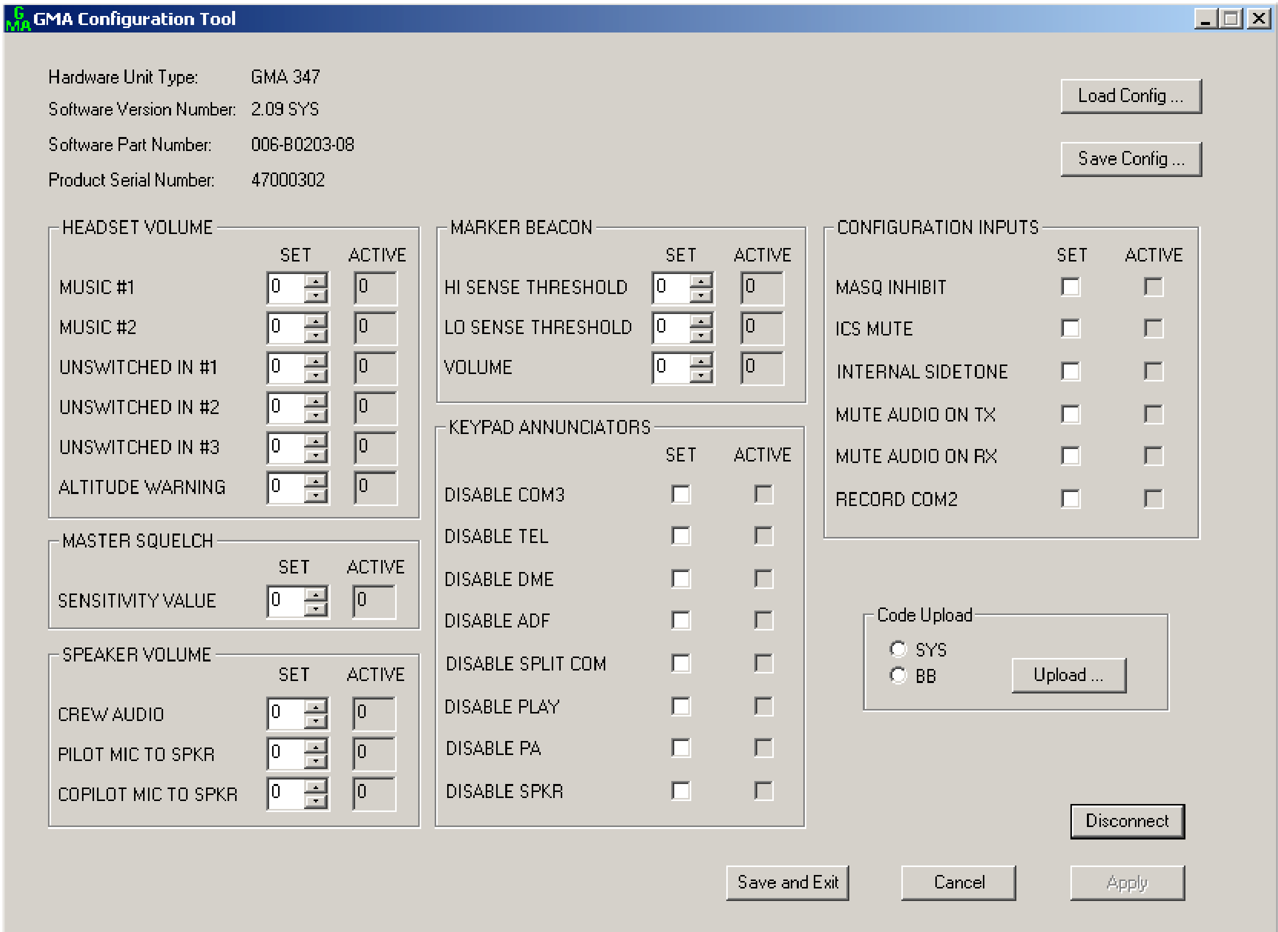


Figure 5-2 GMA Configuration Tool Screen

5.5 Connect and Disconnect Buttons

When the GMA Configuration Tool is first opened, all available COM ports will continuously be queried until a connection is made with a GMA 347 (Figure 5-3). All SET boxes will become editable and the product information will appear in place of the "No Connection" message once the initial connection is made.

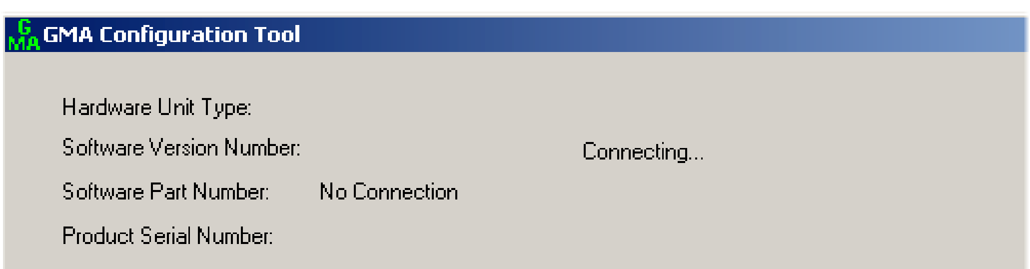


Figure 5-3 Connecting to the GMA 347

If the user presses the Disconnect button after an initial connection is made with the GMA 347, the Connect button will replace the Disconnect button. After the Connect button is pressed the application will behave similarly to initial startup in that it will continuously try to connect to a GMA 347 on COM ports 1 – 10 until successful.

If a GMA 347 is connected to the PC COM port, the Disconnect button will be visible above the Apply button. Pressing the Disconnect button causes the GMA 347 Configuration Tool to disconnect from the GMA 347 and the Connect button will have to be pressed to reconnect.

NOTE

If there is a connection between the PC and the GMA 347 and the connection gets interrupted for more than five seconds (either by loss of power to the GMA 347 or a disconnected data cable), the effect will be identical to pressing the Disconnect button.

5.5.1 Save and Exit Buttons

The Save and Exit button will apply the SET settings and will close the Configuration Tool.

5.5.2 Cancel Button

The Cancel button will NOT apply the SET settings and will close the Configuration Tool.

5.5.3 Apply Button

The Apply button will apply the SET settings and the Configuration Tool will remain open.

5.5.4 Upload Button

The Upload button is used to perform a system or boot block code upload.

5.5.5 Load Config and Save Config Buttons

The Load Config option will load settings from a configuration file into the GMA 347. The data format of the config file is shown in the CONFIG EXAMPLE at the end of this document. The config file format should never be changed, only the values that follow the equals (=) signs.

If values entered are not valid as specified in the VALID DATA RANGES section at the end of this document, the incorrect value will be replaced with a default value.

For options that have a data range of –31 to 31 the Load Config operation will accept a two digit number with or without a negative sign (Ex…. -15, 15). If characters are entered after a number (i.e. 8c), the 8 will be the only value output to the application's window. If only characters are entered, a zero (0) will be output to the display for that value.

For options that use a 0 or 1 for the config, a 0 represents NOT SET, and a 1 represents that the option will be SET.

The Save Config button queries the GMA 347 for the current config values, then stores those values in a ".ini" file regardless of whether or not the SET box is different than the ACTIVE box. The default file type is ".ini". When saving the config file leave the file type as ".ini". This will make it easier when loading the Config using the Load Config button (since the file type is defaulted to ".ini").

5.6 Configuration Tool Settings

5.6.1 Numeric Adjustments

Volume and threshold levels can be adjusted from –31 to +31. To change the level use the computer mouse and click in the "SET" field to be modified, enter a number within the range and hit the enter key. Or, use the mouse and click the up or down arrow in the field to change the value. After changing a value, click the Apply button at the bottom right corner of the GMA 347 Configuration Tool. After clicking the Apply button, the "ACTIVE" field will be updated to show the current settings.

5.6.2 Configuration Settings

Clicking in the "SET" field of an enable/disable (checkbox) option will modify the option. The configuration of the enable/disable item will become "ACTIVE" in the unit upon clicking the Apply button. Modifying a numeric value in the "SET" field and clicking the Apply button will make the numeric value "ACTIVE" in the unit

5.6.3 Configuration Options

Each setting will have a SET value and an ACTIVE value shown on the GMA 347 Configuration Tool. The SET values can be altered. The ACTIVE values represent the value that the unit currently has stored.

5.6.4 Headset Volume

<table>
<tr><td>MUSIC #1</td><td rowspan="6">Volume adjustments can be made by adjusting the volume up or down for each of the listed audio selections. Increasing the number will increase the volume and decreasing the number will decrease the volume.</td></tr>
<tr><td>MUSIC #2</td></tr>
<tr><td>UNSWITCHED IN #1</td></tr>
<tr><td>UNSWITCHED IN #2</td></tr>
<tr><td>UNSWITCHED IN #3</td></tr>
<tr><td>ALTITUDE WARNING</td></tr>
</table>

5.6.5 Master Squelch

SENSITIVITY VALUE	The sensitivity level of the Master Squelch can be adjusted up or down. Increasing the number will increase the receiver sensitivity (decrease the amount of audio required to break squelch). Decreasing the number will decrease the receiver sensitivity (increase the amount of audio required to break squelch).

5.6.6 Speaker Volume

<table>
<tr><td>CREW AUDIO</td><td>Volume adjustments can be made by adjusting the volume up or down. Increasing the number will increase the volume and decreasing the number will decrease the volume.</td></tr>
<tr><td>PILOT MIC TO SPKR</td><td rowspan="2">Volume adjustments can be made by adjusting the volume up or down. Increasing the number will increase the volume and decreasing the number will decrease the volume.</td></tr>
<tr><td>COPILOT MIC TO SPKR</td></tr>
</table>

5.7 Marker Beacon

HI SENSE THRESHOLD	Both High and Low sensitivity threshold numbers can be adjusted up or down. Increasing the number will decrease the threshold required for a lamp on condition. Decreasing the number will increase the threshold required for a lamp on condition.
LO SENSE THRESHOLD	
VOLUME	Volume adjustments can be made by adjusting the volume up or down. Increasing the number will increase the volume and decreasing the number will decrease the volume.

5.8 Keypad Annunciators

DISABLE COM3	Each of the following keys can be disabled so that pushing the associated button will do nothing.
DISABLE TEL	
DISABLE DME	
DISABLE ADF	
DISABLE SPLIT COM	
DISABLE PLAY	
DISABLE PA	
DISABLE SPKR	

5.9 Configuration Inputs

MASQ INHIBIT	Setting this option will turn off the Master Squelch.
ICS MUTE	Setting this option will mute Music 1 during ICS activity.
INTERNAL SIDETONE	Setting this option will provide sidetone for installations using transceivers that do not provide sidetone.
MUTE AUDIO ON TX	Setting this option will mute all secondary COM audio when transmitting audio on the primary COM.
MUTE AUDIO ON RX	Setting this option will mute all secondary COM audio when receiving audio on the primary COM.
RECORD COM2	Setting this option will record COM 2 audio on the voice recorder when the unit is in Split COM mode.

5.10 Code Upload

To upload code, first select the type of code to be loaded into the unit. SYS is SYSTEM code and BB is BOOT BLOCK code. If no selection is made by using the mouse to select a radio button and "Upload" is selected, Figure 5-4 will appear to indicate a selection must be made to specify the code type to be loaded.



Figure 5-4 Radio Button Not Chosen and Upload Selected

After selecting the type of code to load, Figure 5-5 will open for the Hex file of the software to be selected.

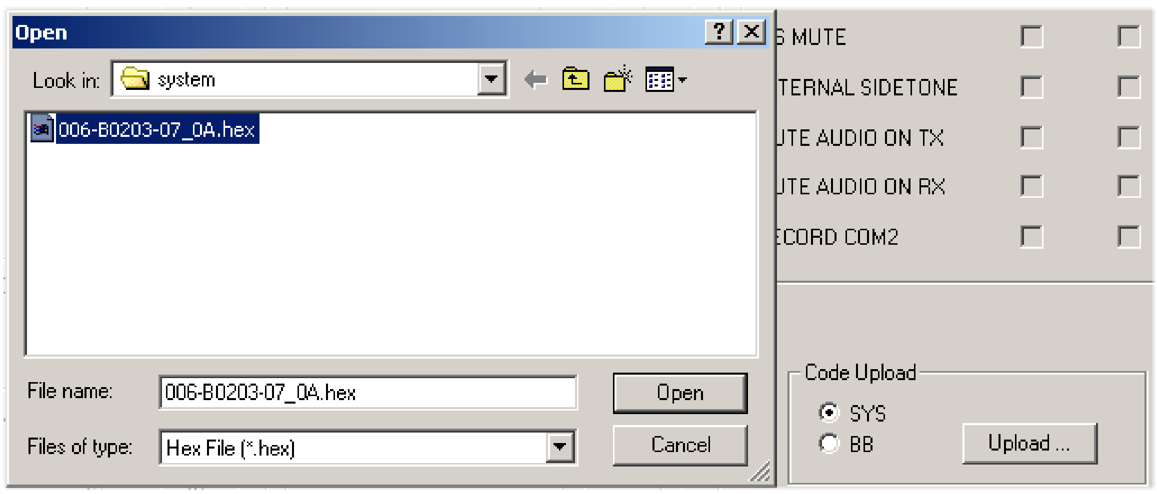


Figure 5-5 File Selection

Select the Hex file to upload and click on Open. If boot code is selected while attempting to do a system code upload, Figure 5-6 will warn about the possible user error. Clicking cancel will allow the correct Hex file to be selected.

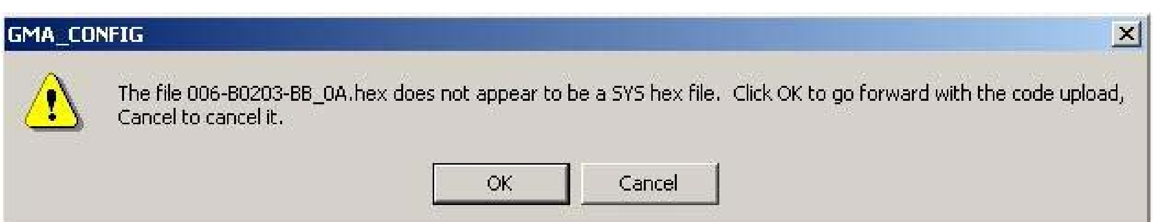


Figure 5-6 Wrong Hex File Selected (Selecting Boot Code for System Code Upload)

If system code is selected for a boot block upload, Figure 5-7 will warn that the wrong hex file has been selected.



Figure 5-7 Wrong Hex File Selected (Selecting System Code for Boot Code Upload)

Selecting the correct Hex file and clicking Open will start the code upload. After the correct Hex file is selected, Figure 5-8 will open with the title "Erasing Flash…". In approximately 20 seconds the window displayed in Figure 5-8 will turn into the window displayed in Figure 5-9. The "Uploading Flash…" window shows the percentage of code uploaded, the time remaining, and the time elapsed

<u>Flash being erased</u>

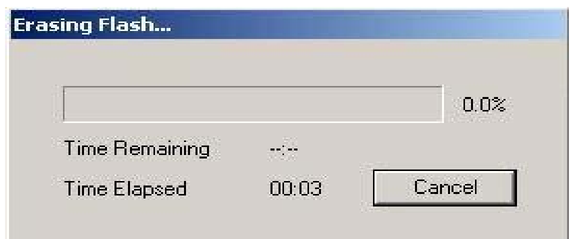


Figure 5-8 Erasing Flash

<u>Code Upload window after flash has been erased</u>

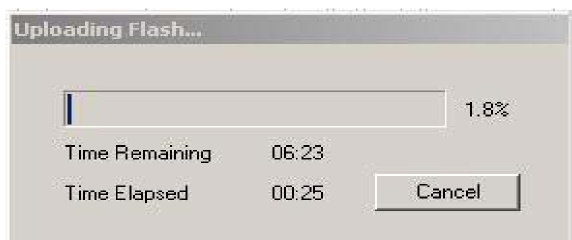


Figure 5-9 Uploading Flash

If the Cancel button is clicked while the code is being uploaded, Figure 5-10 will warn that a code upload is in progress. Click No to resume the code upload. Click Yes to cancel the code upload.

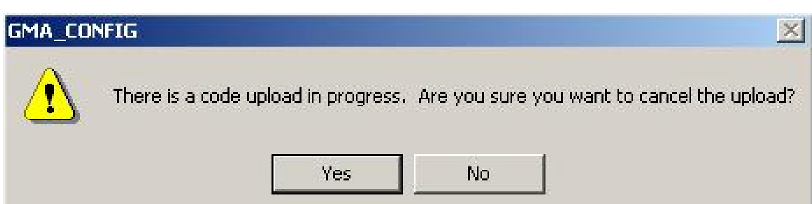


Figure 5-10 Canceling a Code Upload

If the code upload is cancelled, Figure 5-11 will show that the code upload failed.

NOTE

If this failure occurs DO NOT turn the unit power off. Reselect the code to be uploaded and attempt the code upload again.



Figure 5-11 Code Upload Failed

When the code upload is finished, Figure 5-12 will appear to indicate code upload completion.



Figure 5-12 Code Upload Complete

5.11 Configuration Example

```
hs_music1_vol=0
hs_music2_vol=0
hs_unswch1_vol=0
hs_unswch2_vol=0
hs_unswch3_vol=0
hs_altwarn_vol=0
spkr_crew_vol=0
mkr_vol=0
dsbl_spkr=0
pil_mic_vol=0
cop_mic_vol=0
master_sql_level=0
lo_sens_thrd=0
hi_sens_thrd=0
masq_inht=0
ics_mute=0
intl_sidetone=0
dsbl_play=0
dsbl_pa=0
mute_tx=0
mute_rx=0
dsbl_split_com=0
rec_com2=0
dsbl_com3=0
dsbl_tel=0
dsbl_dme=0
dsbl_adf=0
```

5.12 Valid Data Ranges

DESCRIPTION	VALID DATA
Headset music 1 volume	-31 – 31
Headset music 2 volume	-31 – 31
Headset unswitched 1 volume	-31 – 31
Headset unswitched 2 volume	-31 – 31
Headset unswitched 3 volume	-31 – 31
Headset altitude warning volume	-31 – 31
Speaker crew audio volume	-31 – 31
Headset marker beacon volume	-31 – 31
Disable speaker	0 or 1
Pilot mic to speaker volume	-31 – 31
CoPilot mic to speaker volume	-31 – 31
Master squelch sensitivity level	-31 – 31
LO sense threshold	-31 – 31
HI sense threshold	-31 – 31
MASQ inhibit	0 or 1
ICS mute	0 or 1
Select internal sidetone	0 or 1
Disable play	0 or 1
Disable PA	0 or 1
Mute audio on TX	0 or 1
Mute audio on RX	0 or 1
Disable split com	0 or 1
Select to record COM 2	0 or 1
Disable COM3 annunciator	0 or 1
Disable TEL annunciator	0 or 1
Disable DME annunciator	0 or 1
Disable ADF annunciator	0 or 1

APPENDIX A CERTIFICATION DOCUMENTS

A.1 Airworthiness Approval

Airworthiness approval of the GMA 347 may be acquired by the use of FAA Form 337. The following is provided as sample wording for Form 337, when replacing an existing audio panel with a Garmin GMA 347 Audio Panel. Modify appropriately for new installations.

> Removed the existing [model] audio panel and replaced with a Garmin GMA 347 Audio Panel and Marker Beacon, P/N 010-00275-xx in [aircraft location].
>
> The GMA 347 is FAA TSO Approved to C50c and C35d Class A. The GMA 347 meets RTCA DO-160D environmental qualifications for this installation. See Section 1 of the GMA 347 Installation Manual.
>
> Installed in accordance with the Garmin GMA 347 Installation Manual 190-00325-01, Revision [ ], and AC 43.13-2, Chapters 2, and 3.
>
> The GMA 347 interfaces with existing aircraft radios per the Installation Manual instructions. The Installation Manual provides detailed installation instructions and wiring diagrams (Sections 2, 3, and 4 and Appendices B and C).
>
> Power is supplied to the GMA 347 through an existing [AUDIO 5] 5-Amp circuit breaker that was previously used by the existing audio panel. The net electrical load is unchanged.
>
> Aircraft equipment list, weights and balance amended. Compass compensation checked and found to conform to applicable regulations.

A.2 Continued Airworthiness

Maintenance of the GMA 347 is "on condition" only. Refer to the GMA 347 Maintenance Manual (Garmin P/N 190-00325-02). Periodic maintenance of the GMA 347 is not required.

The following sample Instructions for Continued Airworthiness (ICA) provides assistance in preparing ICA for the Garmin GMA 347 unit installation as part of an FAA Type Certificate (TC) or Supplemental Type Certificate (STC) project, to comply with 14 CFR §§23.1529 and 25.1529, "Instructions for Continued Airworthiness".

Items that may vary by aircraft make and model are shown in braces ("[ ]") and should be filled in as appropriate. Some of the checklist items do not apply, in which case they should be marked "N/A" (Not Applicable).

Instructions For Continued Airworthiness, Garmin GMA 347 Audio Panel In An [Aircraft Make And Model]

1. Introduction

[Aircraft that has been altered: Registration (N-) number, Make, Model and Serial Number]

Content, Scope, Purpose and Arrangement:	This document identifies the Instructions for Continued Airworthiness for a Garmin GMA 347 installed in an [aircraft make and model].
Applicability:	Applies to a Garmin GMA 347 installed in an [aircraft make and model].
Definitions/Abbreviations:	None, N/A.
Precautions:	None, N/A.
Units of Measurement:	None, N/A.
Referenced Publications:	Garmin GMA 347 Audio Panel Installation Manual, P/N 190-00325-01 Garmin GMA 347 Audio Panel Maintenance Manual, P/N 190-00325-02 Garmin GMA 347 Audio Panel Pilot's Guide, P/N 190-00325-00 STC/TC # [applicable STC/TC number for the specific aircraft installation]
Distribution:	This document should be a permanent aircraft record.

2. Description of the System

Garmin GMA 347 Audio Panel with interface to external transceivers and [include other equipment/systems as appropriate]. Refer to Appendix C and Figures C-1 through C-5 of this manual for interconnect information. Refer to aircraft manufacturer approved interconnect for actual installation. Marker Beacon antenna installation, removal and replacement should be in accordance with applicable provisions of AC 43.13-1B and AC 43.13-2A.

3. Control, Operation Information

Refer to the GMA 347 Audio Panel Pilot's Guide, P/N 190-00325-00.

4. Servicing Information

N/A

5. Maintenance Instructions

Maintenance of the GMA 347 Audio Panel is 'on condition' only. Periodic maintenance is not required. Refer to the GMA 347 Audio Panel Maintenance Manual.

6. Troubleshooting Information

Refer to the GMA 347 Audio Panel Maintenance Manual.

7. Removal and Replacement Information

Refer to Sections 2 and 3 of the GMA 347 Audio Panel Installation Manual. If the unit is removed and reinstalled, a functional check of the equipment should be conducted.

8. Diagrams

Refer to Appendices B and C of the GMA 347 Audio Panel Installation Manual for installation drawings and interconnect examples.

9. Special Inspection Requirements

N/A

10. Application of Protective Treatments

N/A

11. Data: Relative to Structural Fasteners

GMA 347, antenna and appropriate mounting hardware installation, removal and replacement should be in accordance with applicable provisions of AC 43.13-1B and AC 43.13-2A.

12. Special Tools

N/A

13. This Section is for Commuter Category Aircraft Only

A. Electrical loads: Refer to Sections 1 and 4 of the GMA 347 Audio Panel Installation Manual.
B. Methods of balancing flight controls: N/A.
C. Identification of primary and secondary structures: N/A.
D. Special repair methods applicable to the airplane: Antenna installation, removal, and replacement should be in accordance with applicable provisions of AC 43.13-1B and AC 43.13-2A.

14. Overhaul Period

No additional overhaul time limitations.

15. Airworthiness Limitation Section

N/A.

A.3 Environmental Qualification Form, GMA 347 Audio Panel

The following pages are copies of the Environmental Qualification Forms for the Garmin GMA 347 Audio Panel (005-00155-79), provided for reference only.

GMAX347 Environmental Qualification Form

Nomenclature:
GMAX347 Audio Panel

Type/Model/Part Number:
GMA347 GPN 010-00275-( ) includes 011-00807-( )
GMA1347 GPN 010-00276-( ) includes 011-00809-( )

TSO/JTSO Number:
TSO-C35d Class A
TSO-C50c

Manufacturer's Specification And/Or Other Applicable Specification:
004-00146-00

Manufacturer:
Garmin Ltd. or its subsidiaries

Address:
1200 East 151st Street
Olathe, Kansas 66062
U.S.A.

RTCA DO-160D Conditions	DO-160D Section and Date of Issue	Description of Conducted Tests
Temperature and Altitude	4.0	Equipment tested to Categories A 2 B 2 F 1
Ground Survival Low/Operating Low	4.5.1	
Ground Survival High/Short-Time Operating High	4.5.2	
Operating Temperature High	4.5.3	
In-Flight Loss of Cooling	4.5.4	Not Applicable – Cooling Not Required.
Altitude	4.6.1	
Decompression	4.6.2	
Overpressure	4.6.3 (Issued 07/29/97)	
Temperature Variation	5.0 (Issued 07/29/97)	Equipment tested to Category B
Humidity	6.0 (Issued 07/29/97)	Equipment tested to Category A
Operational Shocks & Crash Safety Sustained Crash Safety	7.0 7.3.2 (Issued 07/29/97)	Equipment tested to Category B Equipment Tested to Aircraft Type 5, Test Type R
Vibration	8.0 (Change No. 1 Issued 12/14/2000)	Equipment tested to Category S, Test Curve M, and Category S 2 , Test Curve B 2 (See Note 1)

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Figure A-1. GMA 347 Environmental Qualification Form (Sheet 1 of 3)

Explosion Proofness	9.0 (Issued 07/29/97)	Equipment identified as Category X, no test performed
Waterproofness	10.0 (Issued 07/29/97)	Equipment identified as Category X, no test performed
Fluids Susceptibility	11.0 (Issued 07/29/97)	Equipment identified as Category X, no test performed
Sand and Dust	12.0 (Issued 07/29/97)	Equipment identified as Category X, no test performed
Fungus Resistance	13.0 (Issued 07/29/97)	Equipment identified as Category X, no test performed
Salt Spray	14.0 (Issued 07/29/97)	Equipment identified as Category X, no test performed
Magnetic Effect	15.0 (Issued 07/29/97)	Equipment tested to Category Z
Power Input	16.0 (Change No. 2 Issued 6/12/2001)	Equipment tested to Categories BZ
Voltage Spike	17.0 (Issued 07/29/97)	Equipment tested to Category A
Audio Frequency Conducted Susceptibility — Power Inputs	18.0 (Change No. 2 Issued 6/12/2001)	Equipment tested to Categories BZ
Induced Signal Susceptibility	19.0 (Issued 07/29/97)	Equipment tested to Category A
Radio Frequency Susceptibility (Radiated and Conducted)	20.0 (Change No. 1 Issued 12/14/2000)	Equipment tested to Category T (See Note 3)
Emission of Radio Frequency Energy	21.0 (Issued 07/29/97)	Equipment tested to Category B
Lightning Induced Transient Susceptibility	22.0 (Change No. 3 Issued 12/05/2002)	Equipment tested to Categories A Z X X X (See Note 2)
Lightning Direct Effects	23.0 (Issued 07/29/97)	Equipment identified as Category X, no test performed
Icing	24.0 (Issued 07/29/97)	Equipment identified as Category X, no test performed
Electrostatic Discharge (ESD)	25.0 (Issued 07/29/97)	Equipment identified as Category X, no test performed

Notes and Remarks:

1. Vibration Test Curve M was increased as follows: 0.1 inches pk-pk double amplitude from 15Hz to 17Hz and 1.5g pk from 17Hz to 55Hz.

2. Power Input pins tested to level A2. Reversionary Mode pins tested to level A3. All other pins tested to level A1. All pins relevant to Failsafe operation tested to level A1 with the UUT in Failsafe mode (i.e. power removed). Configuration Module and unused (spare) pins were not tested.

   Qualification to additional levels and configurations has been shown as follows:

   Garmin Report 005-00291-00 G1000 SHIELD BLOCK QUALIFICATION
   This report shows that all part numbers on this EQF, when installed and configured as per this report, may substitute a Shield Block in place of a SPIDER.

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Figure A-1. GMA 347 Environmental Qualification Form (Sheet 2 of 3)

Garmin Report 005-00265-12 HIRF and Lightning Test Plan, GFC 700
Garmin Report 005-00265-31 HIRF and Lightning TSO Report, GFC 700
The above two reports show that all part numbers on this EQF, when installed and configured as per these reports, comply with FAA Special Conditions as indicated in these reports. The units pass the stated pass/fail criterion when tested as stated in the reports to radiated and conducted susceptibility category W.

3. Qualification to additional levels and configurations has been shown as follows:

Garmin Report 005-00291-00 G1000 SHIELD BLOCK QUALIFICATION
This report shows that all part numbers on this EQF, when installed and configured as per this report, may substitute a Shield Block in place of a SPIDER.

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Figure A-1. GMA 347 Environmental Qualification Form (Sheet 3 of 3)

APPENDIX B ASSEMBLY AND INSTALLATION DRAWINGS

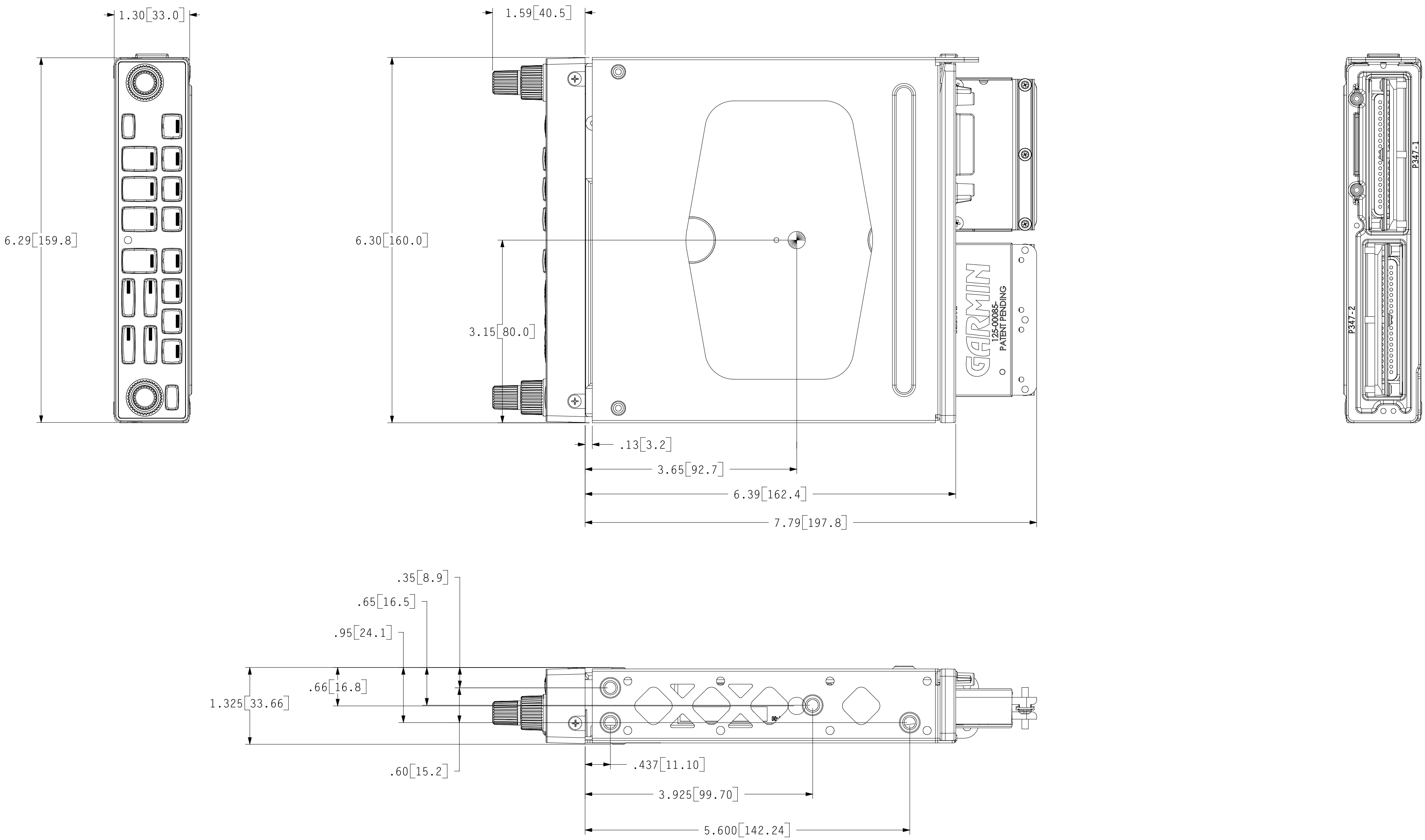


Figure B-1. GMA 347 Outline Drawing

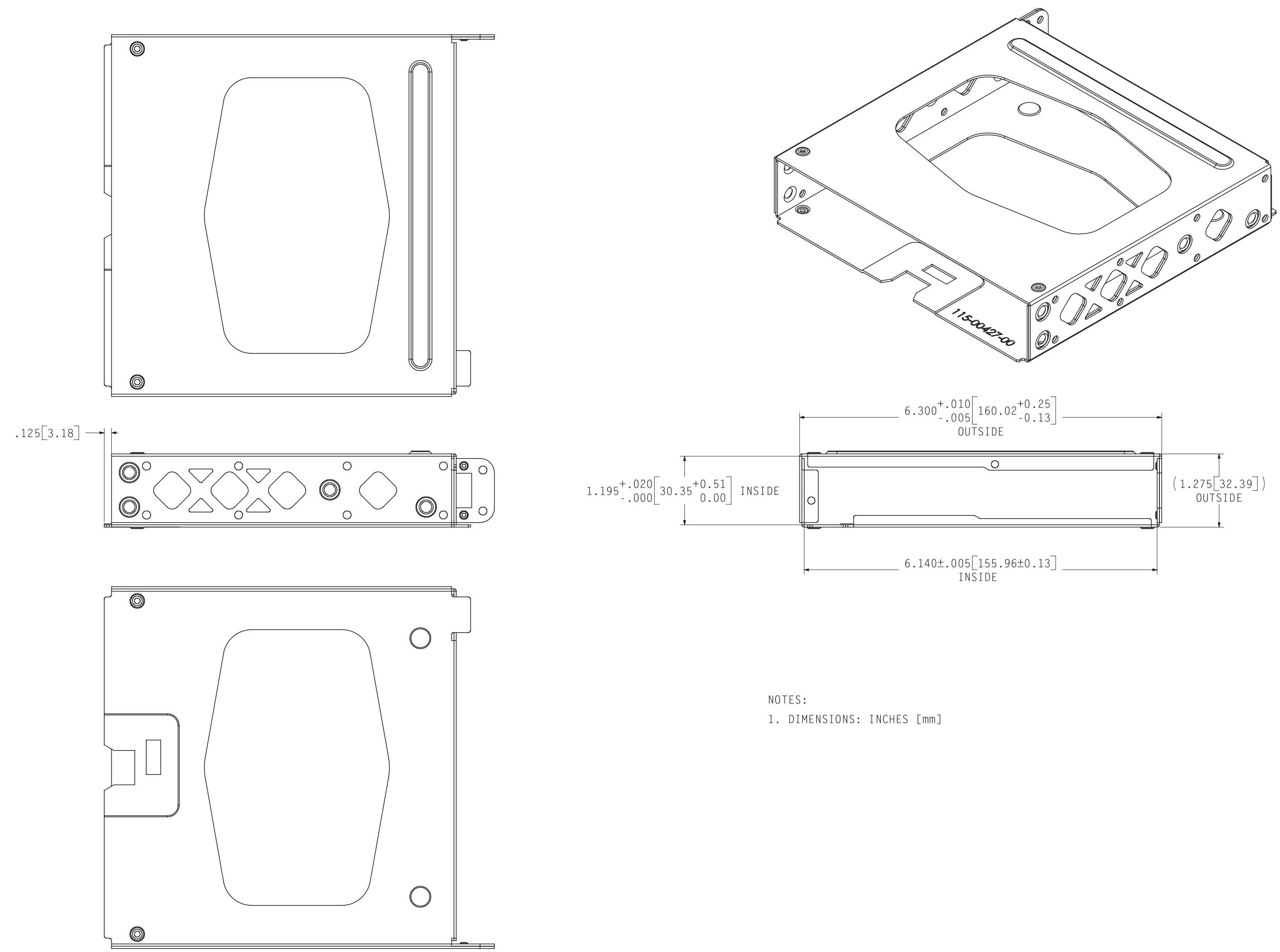
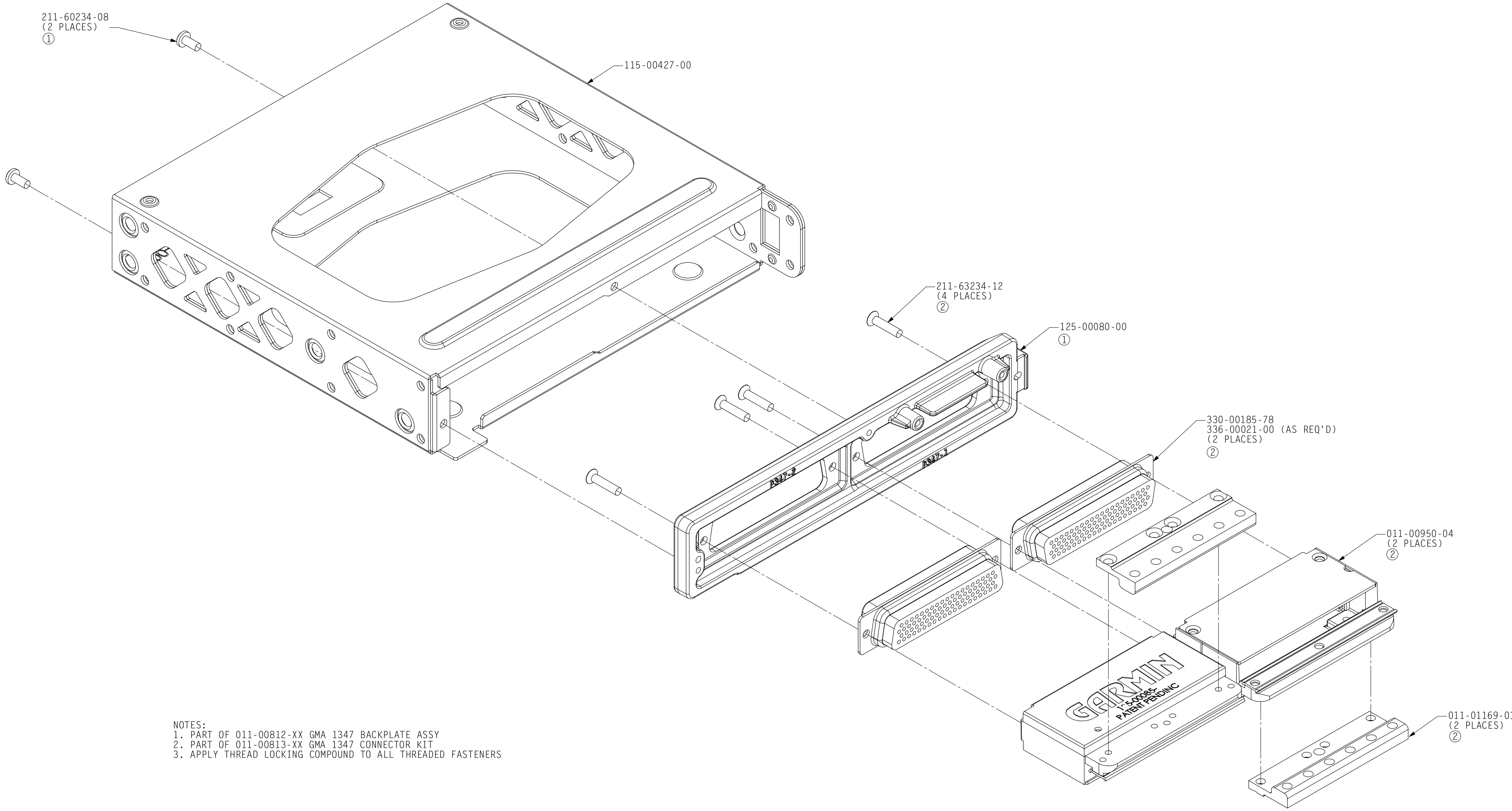
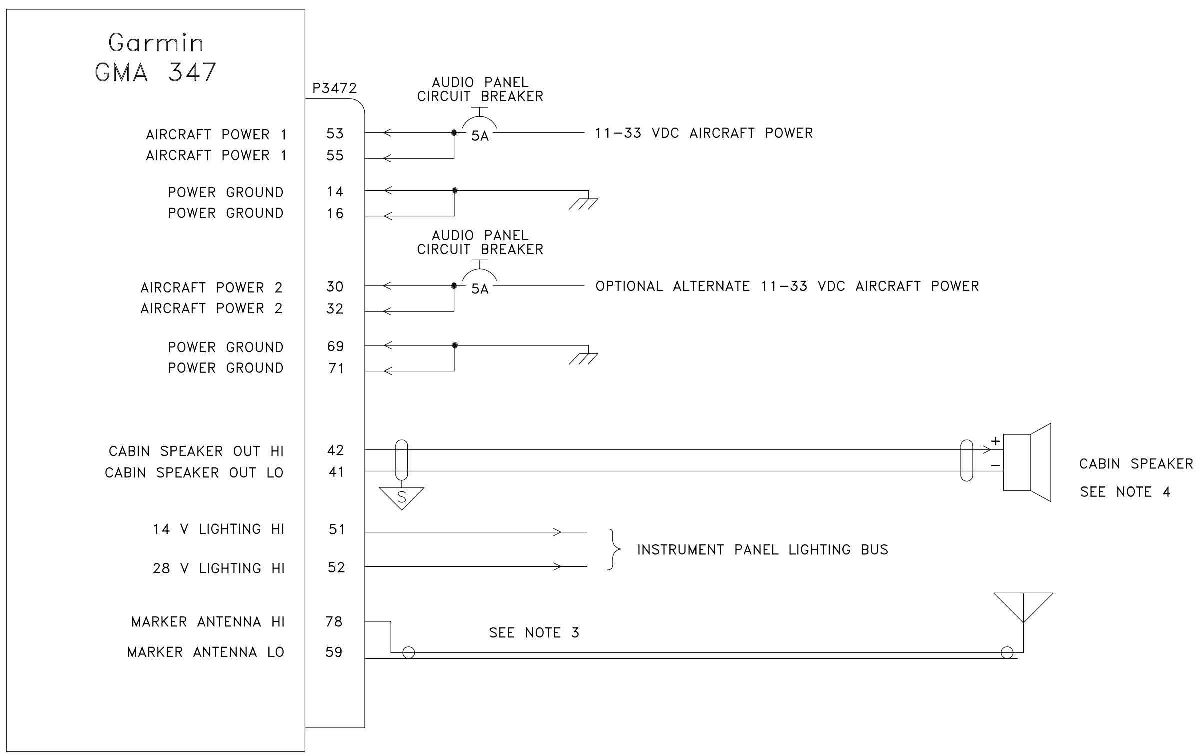


Figure B-2. GMA 347 Rack Dimensions (115-00427-00)



NOTES:
1. PART OF 011-00812-XX GMA 1347 BACKPLATE ASSY
2. PART OF 011-00813-XX GMA 1347 CONNECTOR KIT
3. APPLY THREAD LOCKING COMPOUND TO ALL THREADED FASTENERS

Figure B-3. GMA 347 Connector/Rack Assembly Drawing



NOTES:

1. ALL WIRES 22 AWG OR LARGER UNLESS OTHERWISE NOTED
2. SYMBOL DESIGNATIONS

TWISTED SHIELDED PAIR SHIELD TERMINATED TO GROUND

TWISTED SHIELDED PAIR SHIELD FLOATS

WIRE SPLICE CONNECTION

CIRCUIT BREAKER

SHIELDED SINGLE CONDUCTOR SHIELD TERMINATED TO GROUND

COAXIAL CABLE

AIRFRAME GROUND

ANTENNA

GARMIN SHIELD GROUND REFER TO SECTION 3.

3. TERMINATE MARKER ANTENNA COAX CENTER CONDUCTOR AND SHIELD TO CONNECTOR USING 22 AWG WIRE. FOR ANTENNA SEALANT USE MANUFACTURER'S INSTRUCTIONS, INSTALL ACCORDING TO FAA AC 43.13–2A.
4. 4Ω OR 8Ω, 10 WATTS MAX LOAD.

Figure C-1. GMA 347 Power, Antenna and Speaker Interconnect Wiring Diagram

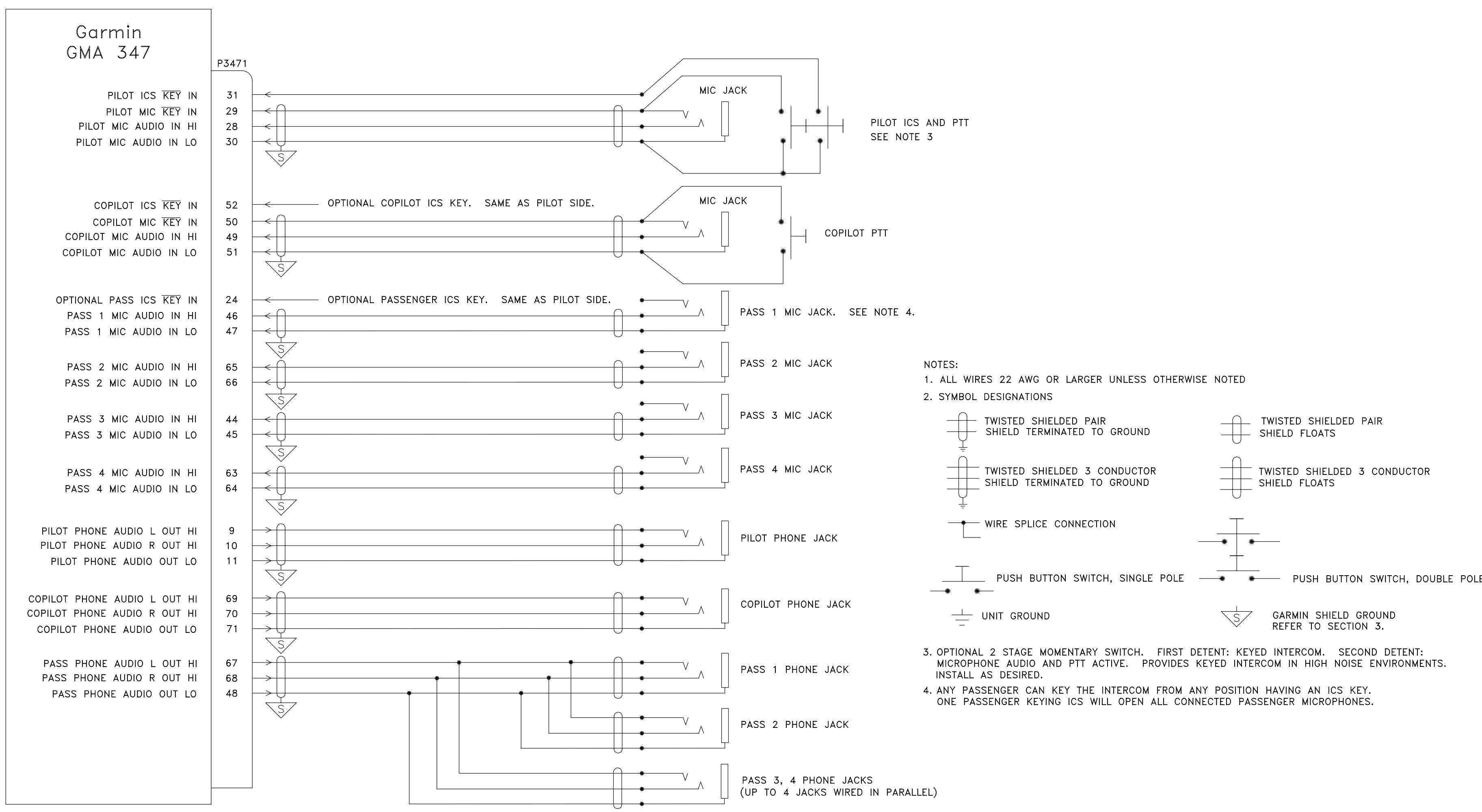
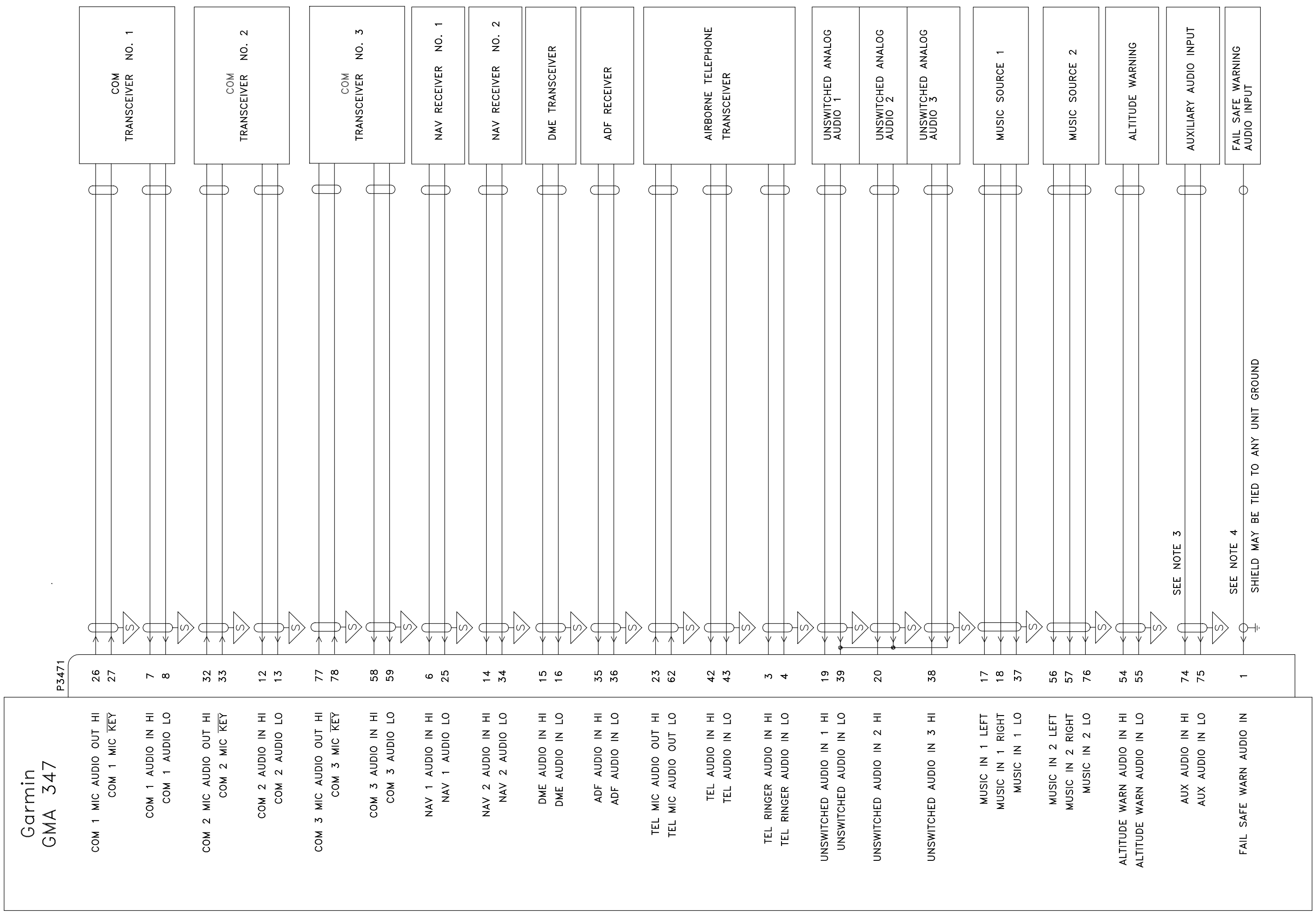


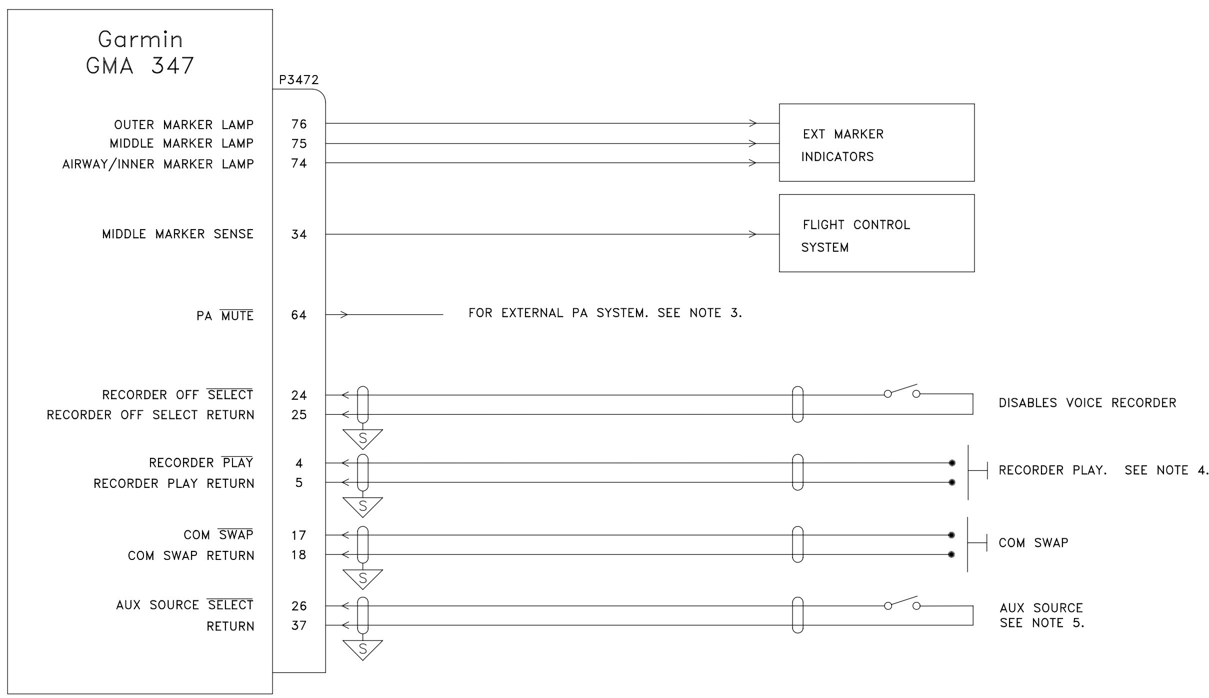
Figure C-2. Mic and Phone Jack Connections, Interconnect Wiring Diagram



NOTES:

1. ALL WIRES 22 AWG OR LARGER UNLESS OTHERWISE NOTED
2. SYMBOL DESIGNATIONS
   - SHIELDED SINGLE CONDUCTOR SHIELD TERMINATED TO GROUND
   - TWISTED SHIELDED PAIR SHIELD TERMINATED TO GROUND
   - TWISTED SHIELDED 3 CONDUCTOR SHIELD TERMINATED TO GROUND
   - WIRE SPLICE CONNECTION
   - SHIELDED SINGLE CONDUCTOR SHIELD FLOATS
   - TWISTED SHIELDED PAIR SHIELD FLOATS
   - TWISTED SHIELDED 3 CONDUCTOR SHIELD FLOATS
   - GARMIN SHIELD GROUND REFER TO SECTION 3.
3. THE AUXILIARY INPUT REQUIRES THAT AN EXTERNAL SWITCH BE MOUNTED ON THE PANEL FOR SELECTING/DESELECTING THE AUXILIARY INPUT. THIS INPUT CAN BE STRAPPED PERMANENTLY TO ALWAYS ALLOW AUXILIARY AUDIO INTO THE UNIT.
4. FAILSAFE WARN AUDIO PROVIDES A MEANS OF THE PILOT COMMUNICATING AND HEARING TRANSMISSIONS IN THE EVENT THE GMA 347 HAS A POWER FAILURE. IN FAILSAFE, THE PILOTS LEFT HEADSET, FAILSAFE AUDIO AND COM 1 ARE TIED TOGETHER.

Figure C-3. Transceiver Analog Connections, Interconnect Wiring Diagram



NOTES:

1. ALL WIRES 22 AWG OR LARGER UNLESS OTHERWISE NOTED
2. SYMBOL DESIGNATIONS
   - TWISTED SHIELDED PAIR SHIELD TERMINATED TO GROUND
   - TWISTED SHIELDED PAIR SHIELD FLOATS
   - WIRE SPLICE CONNECTION
   - GARMIN SHIELD GROUND REFER TO SECTION 3.
   - TOGGLE SWITCH, SINGLE POLE
   - PUSH BUTTON SWITCH, SINGLE POLE
3. PA MUTE IS LOW WHEN ACTIVE. USED TO TRIGGER THE MUTE FUNCTION OF AN EXTERNAL PA SYSTEM.
4. AN EXTERNAL SWITCH MAY BE INSTALLED TO INITIATE PLAYBACK OF THE CLEARANCE RECORDER. NOTE THAT THIS SWITCH PERFORMS THE SAME FUNCTION AS THE PLAY BUTTON ON THE FRONT OF THE UNIT.
5. THE AUXILIARY INPUT REQUIRES THAT AN EXTERNAL SWITCH BE MOUNTED ON THE PANEL FOR SELECTING/DESELECTING THE AUXILIARY INPUT. THIS INPUT CAN BE STRAPPED PERMANENTLY TO ALWAYS ALLOW AUXILIARY AUDIO INTO THE UNIT.

Figure C-4. Discrete Lines, Interconnect Wiring Diagram

GMA 340 vs GMA 347

Refer to the pinouts below when updating an installation from a GMA 340 to a GMA 347.

GMA 340			GMA 347		
Conn.	Pin #		Conn.	Pin #	Description
J1	1		J3472	78	Mkr Ant
J1	2		J3472	59	Mkr Ant Return
J1	3		J3471	58	Com 3 In
J1	4		J3471	59	Com 3 Return
J1	5		J3471	77	Com 3 Mic
J1	6		J3471	78	Com 3 Key*
J1	7		J3471	35	ADF In (ADF 2 In)
J1	8		J3471	36	ADF Return (ADF 2 Return)
J1	9		J3471	7	Com 1 In
J1	10		J3471	8	Com 1 Return
J1	11		J3471	26	Com 1 Mic
J1	12		J3471	27	Com 1 Key*
J1	13		J3471	12	Com 2 In
J1	14		J3471	13	Com 2 Return
J1	15		J3471	32	Com 2 Mic
J1	16		J3472	2	MASQ Inh*
J1	17		J3471	6	Nav 1 In
J1	18		J3471	25	Nav 1 Return
J1	19		J3471	14	Nav 2 In
J1	20		J3471	34	Nav 2 Return
J1	21		J3471	15	DME In (ADF 1 In)
J1	22		J3471	16	DME Return (ADF 1 Return)
J1	23		(Note 1)	(Note 1)	Com 3 Spkr Load
J1	24		(Note 1)	(Note 1)	Com 3 Spkr Load Return
J1	25		(Note 1)	(Note 1)	Com 1 Spkr Load
J1	26		(Note 1)	(Note 1)	Com 1 Spkr Load Return
J1	27		(Note 1)	(Note 1)	Com 2 Spkr Load
J1	28		(Note 1)	(Note 1)	Com 2 Spkr Load Return
J1	29		NC	NC	NC
J1	30		J3471	33	Com 2 Key*
J1	31		J3471	54	Alt Wrn In
J1	32		J3471	55	Alt Wrn Return
J1	33		J3471	28	Pilot Mic In
J1	34		J3471	29	Pilot Mic Key*
J1	35		J3471	30	Pilot Mic Return
J1	36		J3472	74	Ext White Lamp; A
J1	37		J3472	76	Ext Blue Lamp; O
J1	38		J3472	75	Ext Amber Lamp; M
J1	39		J3472	34	Middle Mkr Sens
J1	40		J3471	67	Pass Headset L
J1	41		J3471	68	Pass Headset R
J1	42		J3471	48	Pass Headset Return
J1	43		(Note 2)	(Note 2)	Tel Ringer Return
J1	44		(Note 2)	(Note 2)	Tel Ringer In

GMA 340			GMA 347		
Conn.	Pin #		Conn.	Pin #	Description
J2	1		J3471	11	Pilot Headset Return
J2	2		J3471	71	Co-Pilot Headset Return
J2	3		J3471	69	Co-Pilot Headset L
J2	4		J3471	70	Co-Pilot Headset R
J2	5		(Note 3)	(Note 3)	14V Lgt Lo/28V Lgt Lo
J2	6		(Note 3)	(Note 3)	14V Lgt/28V Lgt Lo
J2	7		(Note 3)	(Note 3)	14V Lgt/28V Lgt
J2	8		J3472	53	Aircraft Power
J2	9		J3472	55	Aircraft Power
J2	10		J3472	14	Aircraft Ground
J2	11		J3472	16	Aircraft Ground
J2	12		J3472	64	PA Mute*
J2	13		J3472	66	ICS Mute Inhibit*
J2	14		J3472	67	ICS Mute Inhibit Return
J2	15		(Note 4)	(Note 4)	High Music Gain Select*
J2	16		J3471	9	Pilot Headset L
J2	17		(Note 5)	(Note 5)	8 Ohm Select*
J2	18		NC	NC	Reserved
J2	19		(Note 6)	(Note 6)	Tone Enable*
J2	20		J3472	17	Swap*
J2	21		J3472	18	Swap Return
J2	22		NC	NC	NC
J2	23		J3471	17	Music 1 L In
J2	24		J3471	18	Music 1 R In
J2	25		J3471	37	Music 1 Return
J2	26		J3471	56	Music 2 L In (NC)
J2	27		J3471	57	Music 2 R In (DME In)
J2	28		J3471	76	Music 2 Return (DME Return)
J2	29		J3471	1	FAILSAFE_WARN
J2	30		J3472	43	Com TX Mute*
J2	31		J3471	10	Pilot Headset R
J2	32		J3471	49	Co-Pilot Mic In
J2	33		J3471	50	Co-Pilot Mic Key*
J2	34		J3471	51	Co-Pilot Mic Return
J2	35		J3471	46	Pass 1 Mic
J2	36		J3471	47	Pass 1 Mic Return
J2	37		J3471	65	Pass 2 Mic
J2	38		J3471	66	Pass 2 Mic Return
J2	39		J3471	44	Pass 3 Mic
J2	40		J3471	45	Pass 3 Mic Return
J2	41		J3471	63	Pass 4 Mic
J2	42		J3471	64	Pass 4 Mic Return
J2	43		J3472	41	Spkr Return
J2	44		J3472	42	Spkr Out

NOTES:

1. COM Speaker loads are not supported on the GMA 347.
2. The GMA 347 supports a full duplex telephone interface.
3. For the GMA 347, connect the lighting bus as shown in the following table:

Voltage	High Side Bus	Low Side Bus
28V lighting	J3472, pin 52	NC
14V lighting	J3472, pin 51	NC

Note that the bus signal is only used as a reference voltage. The unit does not draw power from the bus.

4. There is no music gain select for the GMA 347. The music volume is adjusted via the GMA 347 configuration program.
5. There is no 8 ohm select for the GMA 347. The unit will drive either a 4 or 8 ohm load.
6. There is no tone enable for the GMA 347. There is currently no way to disable the keypress tones.

Figure C-5. GMA 340 to GMA 347 Comparison